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Software Version Dialog/Dialog Advanced

The description of the TSM service program is valid for the software version 6.21.
For software versions < 6.20: menus, descriptions or settings can differ from the SW 6.21 or specific options may not be available.

Dialog/Dialog Advanced

The name Dialog is used to simplify the text in the chapter TSM service program. If necessary Dialog or Dialog Advanced is used to distinguish between different version types.

Commissioning and Service

Only trained personnel must commission and service the Dialog/Dialog Advanced.
Servicing must only be perfomed with proper tools, calibration equipment and be in accordance with the most recent revision of this service manual/technical information, which must be clearly and thoroughly understood.

Electrical Shock Hazard

To prevent electrical shock hazard - Switch off the Dialog/Dialog Advanced and disconnect unit from mains if you have to open the machine for servicing.
Do not touch any exposed wiring or conductive surfaces while the Dialog/Dialog Advanced is opened. The voltages present when electrical power is connected to the Dialog/Dialog Advanced can cause serious injury or death.

TSM Service Program

Only activate the TSM service program for service activities. It is prohibited to connect a patient to the Dialog/Dialog Advanced and to run a therapy if the TSM service program is activated in the Dialog/Dialog Advanced.
If the TSM service program is activated the audible alarm is switched off.
The TSM service program is started in the service mode: supervisor board, hardware switch K1, position 2.

Software

The software is installed in the software mode: supervisor board, hardware switch K1, position 3.

Therapy Mode

After completion of all procedures switch back to the therapy mode: supervisor board, hardware switch K1, position 0.

Calibration

Only perform a calibration after the Dialog/Dialog Advanced has reached working temperature.
You should save the calibration data to the hard disk drive before you exit the TSM service program: *TSM Main Menu*, *File Operations*, *Save Calibration Data*.

Connection and Operation Service Board

The service board must only be operated in the TSM service program. If the service board is connected to the Dialog/Dialog Advanced it is prohibited to connect a patient to the Dialog/ Dialog Advanced and to run a therapy.

Prevent Shorts during Exchange of Boards/ Valves/Pumps (+24 VL)

Standard Power Supply (Ascom)
Prevent shorts during the exchange of boards, valves and pumps: remove the fuse SI 14 6.3 AT (+24 VL) from the standard power supply (Ascom), because the +24 VL reduction is very slow.

Prevent Chemical Burns and Scalding

During servicing on running machines: prevent chemical burns and scalding of the skin due to the penetration of disinfectant or hot liquid.

Cover in Rear Door

Servicing of mechanical assembly groups (components in contact with fluid): the black cover in the rear door must be assembled during servicing because it serves as a spray protection for the assembled printed circuit boards.

O-Rings

Always check o-rings from disassembled groups/components and replace if necessary.

ESD Requirements

Pay attention to ESD requirements, because electronic components are sensitive to electrostatic discharges.

Figures

The displayed figures can differ slightly from the machines on site, due to different hardware statuses.

Fuses

If fuses are replaced they must exactly match the type and rating specified by the manufacturer in the spare parts list/technical information. Where applicable: fuses must be approved by UL/CSA.

Spare Parts

Only use original spare parts manufactured and sold by B. Braun Medizintechnologie GmbH.

Function Check

Check the respective function of the assembly group/component after servicing.
A complete function check must be performed after every service, according to the operating manual.

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4.1 Start TSM Service Program

The *TSM Main Menu* (TSM = Technical Support and Maintenance) is used for servicing the machine. The TSM service program (*TSM Main Menu*) is started as follows:

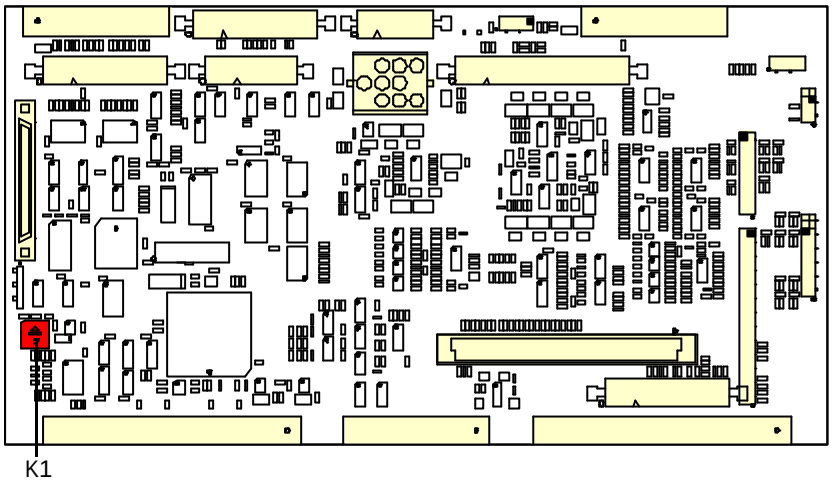
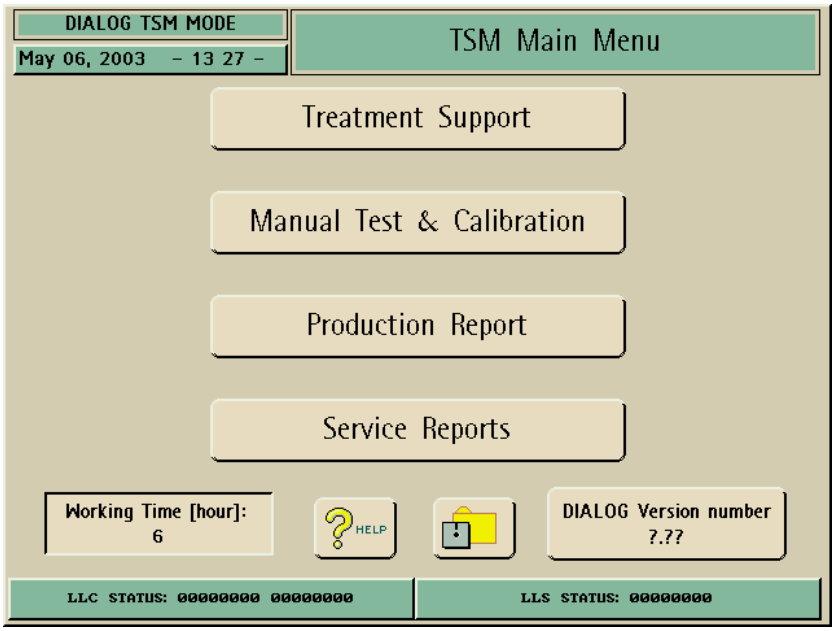


Fig.: Suppervisor Board with Hardware Switch K1

1. Switch off machine.
2. Open rear door.
3. On supervisor board SB: turn hardware switch K1 from position 0 to **position 2**.

   Hardware Switch K1:

   Position 0 = Therapy Mode
   Position 2 = TSM Mode
   Position 3 = Software Update Mode
4. Switch on machine.
   The machine starts in TSM mode.

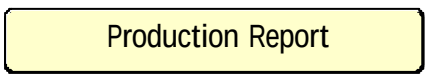


The *TSM Main Menu* is displayed. The following four sub-menus can be selected:

- *Treatment Support*
- *Manual Test and Calibration*
- *Production Report*
- *Service Report*

All basic parameters can be set for the therapy mode in the *Treatment Support* menu.

All manual tests and calibrations can be performed in the *Manual Test and Calibration* menu.



All machine specific data and options are available in the *Production Report* menu.

The *Operation Mode Report* menu can be selected in the *Service Report* menu.

Working Time Counter

The total working time of the Dialog is displayed in the *Working Time Counter* window. The total working time is stored on the hard disk drive.

- Activate additional information with the *HELP* icon.
  - Activate *HELP* icon
  - Select a sub-menu via touch screen.
    (A window with the help text is opened for the selected button.)

The *File Operations* menu (see paragraph 4.7) can be activated with the *Diskette* icon. For example data can be loaded from diskette or saved to diskette.

Diskette Format

From SW ≥ 6.XX (QNX 4) special diskettes for the QNX operating system do not have to be generated. The diskettes for file operation are DOS/Windows compatible, i.e. can be used in a PC with a DOS/Windows operating system.

Note:

The format for patient diskettes and configuration diskettes (TSM) now have DOS format, i.e. are not compatible with QNX 2 diskettes (SW < 6.20).

Dialog Version Number

The actual Dialog software version is displayed in the Dialog version number window (supported SW versions: 2.30/3.4X/ 5.XX/6.XX). The software versions for the top and low level can be displayed and checked (this is also possible in the production report).

4.2 Quit TSM Service Program

The following steps must be taken to quit the service program and to reenter the therapy mode:

1. Switch off machine.
2. On supervisor board SB: turn hardware switch K1 from position 2 to **position 0** therapy mode.
3. Close rear door.
4. Switch on machine.
   The machine starts in therapy mode.

4.3 QNX Operating System

QNX 2 Operating System

A QNX 2 operating system is used for software ≤ 5.XX.

QNX 4 Operating System

A QNX 4 operating system is used for software ≥ 6.20.

Software ≥ 6.20

The format for patient diskettes and configuration diskettes (TSM) now have DOS format, i.e. are not compatible with QNX 2 (SW < 6.20) diskettes.

4.4 Structure of TSM Service Program Software 6.21

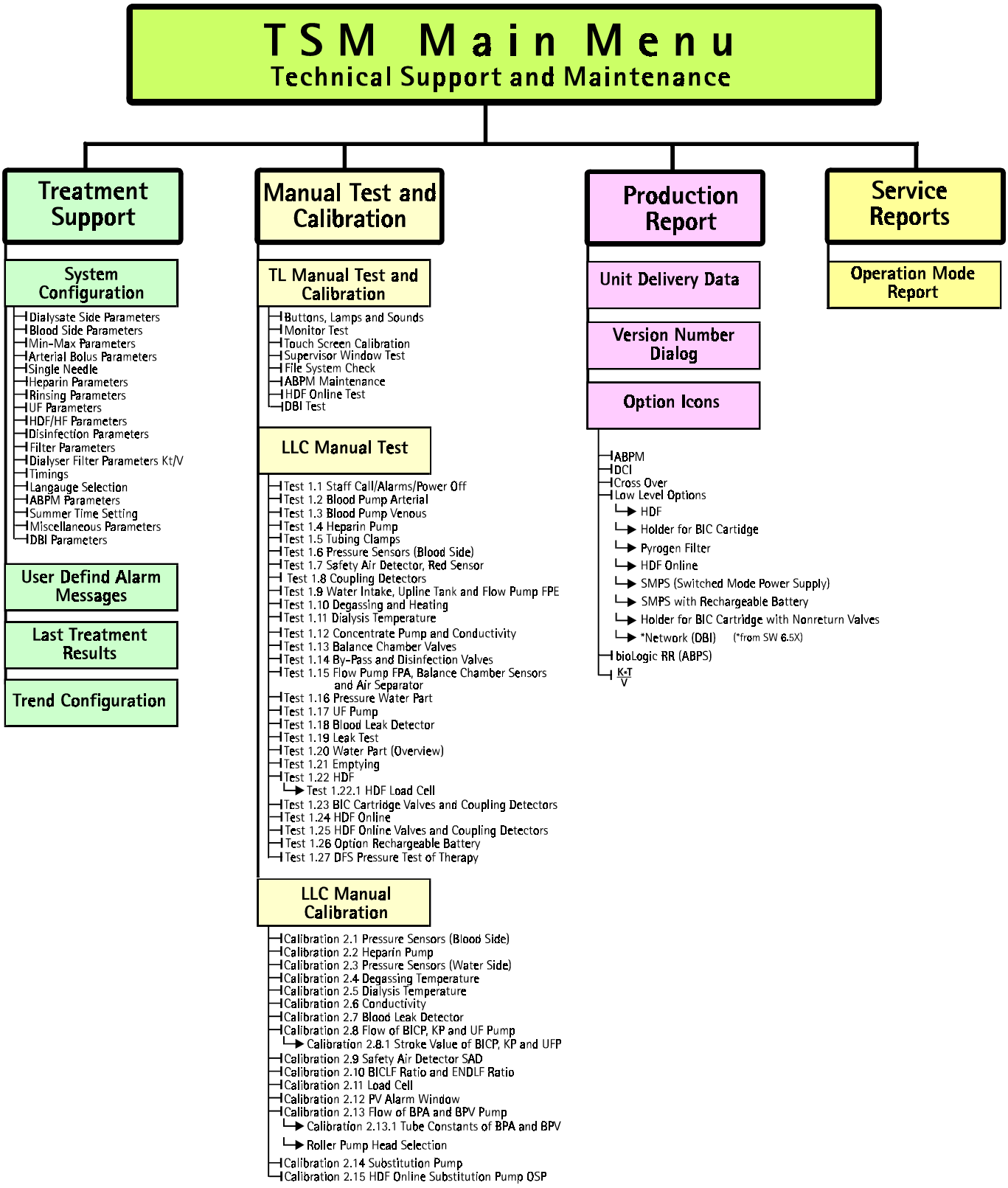

TSM Main Menu
Technical Support and Maintenance
Treatment Support
System Configuration
Dialysate Side Parameters
Blood Side Parameters
Min-Max Parameters
Arterial Bolus Parameters
Single Needle
Heparin Parameters
Rinsing Parameters
UF Parameters
HDF/HF Parameters
Disinfection Parameters
Filter Parameters
Dialyser Filter Parameters Kt/V
Timings
Langauge Selection
ABPM Parameters
Summer Time Setting
Miscellaneous Parameters
DBI Parameters
User Defind Alarm Messages
Last Treatment Results
Trend Configuration
Manual Test and Calibration
TL Manual Test and Calibration
Buttons, Lamps and Sounds
Monitor Test
Touch Screen Calibration
Supervisor Window Test
File System Check
ABPM Maintenance
HDF Online Test
DBI Test
LLC Manual Test
Test 1.1 Staff Call/Alarms/Power Off
Test 1.2 Blood Pump Arterial
Test 1.3 Blood Pump Venous
Test 1.4 Heparin Pump
Test 1.5 Tubing Clamps
Test 1.6 Pressure Sensors (Blood Side)
Test 1.7 Safety Air Detector, Red Sensor
Test 1.8 Coupling Detectors
Test 1.9 Water Intake, Upline Tank and Flow Pump FPE
Test 1.10 Degassing and Heating
Test 1.11 Dialysis Temperature
Test 1.12 Concentrate Pump and Conductivity
Test 1.13 Balance Chamber Valves
Test 1.14 By-Pass and Disinfection Valves
Test 1.15 Flow Pump FPA, Balance Chamber Sensors and Air Separator
Test 1.16 Pressure Water Part
Test 1.17 UF Pump
Test 1.18 Blood Leak Detector
Test 1.19 Leak Test
Test 1.20 Water Part (Overview)
Test 1.21 Emptying
Test 1.22 HDF
Test 1.22.1 HDF Load Cell
Test 1.23 BIC Cartridge Valves and Coupling Detectors
Test 1.24 HDF Online
Test 1.25 HDF Online Valves and Coupling Detectors
Test 1.26 Option Rechargeable Battery
Test 1.27 DFS Pressure Test of Therapy
LLC Manual Calibration
Calibration 2.1 Pressure Sensors (Blood Side)
Calibration 2.2 Heparin Pump
Calibration 2.3 Pressure Sensors (Water Side)
Calibration 2.4 Degassing Temperature
Calibration 2.5 Dialysis Temperature
Calibration 2.6 Conductivity
Calibration 2.7 Blood Leak Detector
Calibration 2.8 Flow of BICP, KP and UF Pump
Calibration 2.8.1 Stroke Value of BICP, KP and UFP
Calibration 2.9 Safety Air Detector SAD
Calibration 2.10 BICLF Ratio and ENDLF Ratio
Calibration 2.11 Load Cell
Calibration 2.12 PV Alarm Window
Calibration 2.13 Flow of BPA and BPV Pump
Calibration 2.13.1 Tube Constants of BPA and BPV
Roller Pump Head Selection
Calibration 2.14 Substitution Pump
Calibration 2.15 HDF Online Substitution Pump OSP
Production Report
Unit Delivery Data
Version Number Dialog
Option Icons
ABPM
IDCI
Cross Over
Low Level Options
HDF
Holder for BIC Cartidge
Pyrogen Filter
HDF Online
SMPS (Switched Mode Power Supply)
SMPS with Rechargeable Battery
Holder for BIC Cartridge with Nonreturn Valves
*Network (DBI) (*from SW 6.5X)
bioLogic RR (ABPS)
K•T/V
Service Reports
Operation Mode Report

Fig. : TSM Service Program

4.5 Service Overview in Therapy Mode

General

The service overview can be selected in therapy mode with the *service key* icon.

The second page of the service overview can be selected with the *service key* icon.

Click the *Door* icon to jump back to the initial menu.

Water Tank	
RVVB:	XX %
NSVB:	TOP/MIDDLE/BOTTOM
Degassing	
EP:	XXXX rpm
RVE:	XX %
PE:	XXX mmHg
TSE:	XX.X °C
Heater	
HEATER:	XX.X %
Air Separator	
LAFSO:	NO AIR/AIR
LAFSU:	NO AIR/AIR
VLA:	OPEN/CLOSED
Temperature	
TSE:	XX.X °C
TSBIC:	XX.X °C
TSD:	XX.X °C
TSD_S:	XX.X °C
Conductivity	
BICLF:	X.X mS/cm
ENDLF:	XX.X mS/cm
ENDLF_S:	XX.X mS/cm
BICP:	XX rpm
BICP_S:	XX rpm
BIC-Ratio:	XX.X
BIC-Ratio_S:	XX.X
KP:	XX rpm
KP_S:	XX rpm
END-Ratio:	XX.X
END-Ratio_S:	XX.X

Balance Chamber	
MSBK1:	XXXXX
MSBK2:	XXXXX
VEBK1_S:	OPEN/CLOSED
VABK1_S:	OPEN/CLOSED
VDEBK2_S:	OPEN/CLOSED
VDABK2_S:	OPEN/CLOSED
VEBK2_S:	OPEN/CLOSED
VABK2_S:	OPEN/CLOSED
VDEBK1_S:	OPEN/CLOSED
VDABK1_S:	OPEN/CLOSED
Flow (Dialysate Fluid)	
FPE:	XXXX rpm
FPA:	XXXX rpm
FMD:	XXX ml/min
FMD_S	XXX ml/min
Valves Bypass	
VBP:	OPEN/CLOSED
VBP_S:	OPEN/CLOSED
VDE:	OPEN/CLOSED
VDE_S:	OPEN/CLOSED
VDA:	OPEN/CLOSED
VDA_S:	OPEN/CLOSED
Valves Disinfection	
VZ:	OPEN/CLOSED
VD	OPEN/CLOSED
VD_S	OPEN/CLOSED
Blood Leak	
BL:	X.XX ‰
BL_S:	X.XX ‰

Ultrafiltration	
UFP:	XX rpm
UFP_S:	XX rpm
PDA:	XXX mmHg
PDA_S:	XXX mmHg
TMP:	XXX mmHg
BIC Cartridge Holder	
BKUS:	OPEN/CLOSED
BKUS_S:	OPEN/CLOSED
BKOS:	OPEN/CLOSED
VVB:	OPEN/CLOSED
VBICP:	OPEN/CLOSED
VBKO:	OPEN/CLOSED
VBKS:	OPEN/CLOSED
Valves Online	
VBE:	OPEN/CLOSED
VBE_S:	OPEN/CLOSED
VDFF:	OPEN/CLOSED
VDFF_S:	OPEN/CLOSED
VSB:	OPEN/CLOSED
VSB_S:	OPEN/CLOSED
VSAA:	OPEN/CLOSED
VSAA_S:	OPEN/CLOSED
VSAE:	OPEN/CLOSED
VSAE_S:	OPEN/CLOSED
Pump Online	
OPS:	XXXX rpm
OPS_S:	XXXX rpm
Substitition Flow Online	
FMS:	XXX ml/min
FMS_S:	XXX ml/min

Blood Side (Pressure)	
PA:	XXX mmHg
PA_S:	XXX mmHg
PBE:	XXX mmHg
PV:	XXX mmHg
PV_S:	XXX mmHg
PBS:	XXX mmHg
PBS_S:	XXX mmHg
Blood Pumps	
BPA:	XXXX rpm
BPA_S:	XXXX rpm
BPV:	XXXX rpm
BPV_S:	XXXX rpm
Tubing Clamps	
SAKA:	OPEN/CLOSED
SAKV:	OPEN/CLOSED
SAKV_S:	OPEN/CLOSED
Air Detector	
SAD:	NO AIR/AIR
SAD_S:	NO AIR/AIR
SAD TIME_S:	OK
SAD REF_S:	XXXX mV
Heparin	
SYRDIA:	XX.X mm
POSITION:	XX.XX mm
Status Selftest	
LLC:	XXXXX
LLS:	XXXXX

LLC/S & TLC Alarm Window

LLC Message Window

Fig.: First Page Service Overview in Therapy Mode

The first page of the service overview can be selected with the *service key* icon.

Click the *Door* icon to jump back to the initial menu.

Dialog - Basic

Relay

B24V_S:	ON/OFF
D24V_S:	ON/OFF
HEATER REL1_S:	ON/OFF
HEATER REL2_S:	ON/OFF

Couplings

SBS1:	COUPLED/UNCOUPLED
SBS2:	COUPLED/UNCOUPLED
BIC_SS:	COUPLED/UNCOUPLED
K_SS:	COUPLED/UNCOUPLED

Red Sensor

RDA:	NO BLOOD/BLOOD
RDA_S:	NO BLOOD/BLOOD
RDV:	NO BLOOD/BLOOD

HDF Bag

Weight

BAG:	X g
BAG_S:	X g

Flow Detector

UF_FLOW:	FLUSS/KEIN FLUSS

Air Detector

SUBAD:	LUFT

Substitution Volume

SUBST:	X ml
SUBST_S:	X ml
SUBST_WV_S:	X ml
SUM INF:	X ml
ACT INF_S:	X ml
INF LEAK_S	X ml

HDF/HF-Online

Reed Sensor

PSAUS:	OPEN/CLOSED
PSABF:	OPEN/CLOSED
FDFS:	OPEN/CLOSED
FHDFS:	OPEN/CLOSED

HDF Volume

HDF/HF_V:	X.X l
HDF/HF_V_S:	X.X l
BOLUS_VOL:	X ml
BOLUS_VOL_S:	X ml

Remaining Filter Time

DF:	X h
HDF:	X h

Remaining Dialysis

DF:	X
HDF:	X

Others

SMPS Battery

Batt. enabled:	YES/NO
Selftest:	NOT OK/OK

WTC	bioLogic
XXXXX h	X

LLC ALARM:	0000	0000	0000	0000	0000	0000	MESSAGE:	0000	0000	0000	0000	0000	0000
LLS ALARM:	0000	0000	0000	0000	0000	0000	FREE M:	XX.X (XX.X - XX.X) Mb					

LLC/S & TLC Alarm Window

LLC Message Window

Fig.: Second Page Service Overview in Therapy Mode

4.5.1 Legend Service Overview in Therapy Mode

ACT INF_S:	Actual infusion supervisor
B24V_S:	24 V cut-off blood side supervisor (HP, BPA, BPV)
BAG:	Bag weight
BAG_S:	Bag weight supervisor
BIC_SS:	Bicarbonate rinsing connector sensor
BICLF:	Bicarbonate conductivity
BICP:	Bicarbonate pump
BICP_S:	Bicarbonate pump supervisor
BIC-RATIO:	Bicarbonate ratio
BIC-RATIO_S:	Bicarbonate ratio supervisor
BKOS:	BIC cartridge holder upper switch
BKUS:	BIC cartridge holder lower switch
BKUS_S:	BIC cartridge holder lower switch supervisor
BL:	Blood leak detector
BL_S:	Blood leak detector supervisor
BOLUS_VOL:	Bolus volumen
BOLUS_VOL_S:	Bolus volumen supervisor
BPA:	Arterial blood pump
BPA_S:	Arterial blood pump supervisor
BPV:	Venous blood pump
BPV_S:	Venous blood pump supervisor
D24V_S:	24 V cut-off dialysate side supervisor (VDA, VDE)
DF:	Remaining time for DF
DF:	Remaining time of dialysis for DF
ENDLF	End conductivity
ENDLF_S	End conductivity supervisor
END-RATIO:	End ratio
END-RATIO_S:	End ratio supervisor
EP:	Degassing pump
F(E)DFS:	Filter recognition DF filter sensor
F(E)HDFS:	Filter recognition HD filter sensor
FMD:	Flow measurement dialysate
FMD:	Substitution flow measurement
FMD_S	Flow measurement dialysate supervisor
FMD_S	Substitution flow measurement supervisor
FPA:	Outlet flow pump
FPE:	Inlet flow pump
HDF/HF_V:	HDF/HF volume
HDF/HF_V_S:	HDF/HF volume supervisor
HDF:	Remaining time for HDF
HDF:	Remaining time of dialysis for HDF
HEATER REL1_S:	Heater relay 1 supervisor
HEATER REL2_S:	Heater relay 2 supervisor
HEATER	Heater
INF LEAK_S:	Infusion leakage supervisor
K_SS:	Concentrate rinsing connector sensor
KP:	Concentrate pump
KP_S:	Concentrate pump supervisor
LAFSO:	Top air separator level sensor
LAFSU:	Bottom air separator level sensor
LLC:	Low level controller
LLS:	Low level supervisor
MSBK1:	Membrane position sensor balance chamber 1
MSBK2:	Membrane position sensor balance chamber 2
NSVB:	Level sensors upline tank
OSP:	Online substitution pump
OSP_S:	Online substitution pump supervisor
PA:	Arterial pressure sensor
PA_S:	Arterial pressure sensor supervisor
PBS:	Blood control pressure sensor
PBS_S:	Blood control pressure sensor supervisor

PDA:	Dialysate outlet pressure sensor
PDA_S:	Dialysate outlet pressure sensor supervisor
PE:	Degassing pressure sensor
POSITION:	Drive position
PSABF(S):	Substitution port drain sensor
PSAUS(S):	Substitution port outlet sensor
PV:	Venous pressure sensor
PV_S:	Venous pressure sensor supervisor
RDA:	Arterial red detector
RDA_S:	Arterial red detector supervisor
RDV:	Venous red detector
RVE:	Degassing control valve
RVVB:	Upline tank control valve
SAD REF_S:	Safety air detector reference voltage supervisor
SAD TIME_S:	Safety air detector time control supervisor
SAD:	Safety air detector
SAD_S:	Safety air detector supervisor
SAKA:	Arterial tubing clamp
SAKV:	Venous tubing clamp
SAKV_S:	Venous tubing clamp supervisor
SBS1:	Rinsing bridge connector sensor 1
SBS2:	Rinsing bridge connector sensor 2
SUBAD:	Substitution air detector
SUBST:	Substitution
SUBST_S:	Substitution supervisor
SUBST_WV_S	Substitution weight volum supervisor
SUM INF:	Sum infusion
SYR_DIA:	Syringe diameter
TMP:	Transmembrane pressure
TSBIC	Bicarbonate temperature sensor
TSD	Dialysate temperature sensor
TSD_S	Dialysate temperature sensor supervisor
TSE	Degassing temperature sensor
TSE	Degassing temperature sensor
UF_Flow:	Ultrafiltration flow
UFP:	Ultrafiltration pump
UFP_S:	Ultrafiltration pump supervisor
VABK1_S:	Outlet valve balance chamber 1 supervisor
VABK2_S:	Outlet valve balance chamber 2 supervisor
VBE:	Vent filter valve
VBE_S:	Vent filter valve supervisor
VBICP:	BIC pump valve
VBKO:	BIC cartridge holder top Valve
VBKS:	BIC cartridge holder concentrate rod valve
VBP:	Bypass valve
VBP_S:	Bypass valve supervisor
VD	Disinfection valve supervisor
VDA:	Dialyser outlet valve
VDABK1_S:	Dialyser outlet valve balance chamber 1 supervisor
VDABK2_S:	Dialyser outlet valve balance chamber 2 supervisor
VDA-S:	Dialyser outlet valve supervisor
VDE:	Dialyser inlet valve
VDEBK1_S:	Dialyser inlet valve balance chamber 1 supervisor
VDEBK2_S:	Dialyser inlet valve balance chamber 2 supervisor
VDE-S:	Dialyser inlet valve supervisor
VDFF:	DF filter valve
VDFF_S:	DF filter valve supervisor
VEBK1_S:	Inlet valve balance chamber 1 supervisor
VEBK2_S:	Inlet valve balance chamber 2 supervisor
VLA:	Air separator valve
VSAA:	Substitution outlet valve
VSAA_S:	Substitution outlet valve supervisor
VSAE:	Substitution inlet valve

VSAE_S:	Substitution inlet valve supervisor
VSB:	Substitution bypass valve
VSB_S:	Substitution bypass valve supervisor
VVB:	Upline tank valve
VZ:	Circulation valve
Working Time Counter	Working time counter (WTC)
bioLogic RR	bioLogic RR Option
LLC ALARM	The low level controller alarms are displayed in a hexadecimal format. The corresponding bit alarms are shown in the LLC alarm window.
LLS ALARM	The low level supervisor alarms are displayed in a hexadecimal format. The corresponding bit alarms are shown in the LLS alarm window.
LLC MESSAGE	The LLC messages are displayed in a hexadecimal format. The corresponding bit messages are shown in the message window.
FREE MEMORY	Free RAM memory (DIMM/SIMM).
LLC/S & TLC Alarm Window	• Low level controller alarm text Window messages according to the LLC hex numbers from the LLC alarm window. • Low level supervisor alarm text Window messages according to the LLS hex numbers from the LLS alarm window. • Top level controller alarm messages Window according to the TLC hex numbers from the TLC alarm window.
LLC Message Window	LLC text messages according to the LLC message hex numbers from LLC message window.

4.6 Service Overview in TSM Service Program

General The service overview can be selected with the / key in the TSM service program.

Required Data to LLC			Actual Data from LLC				
PUMP		**VALVE**		**PUMP**		**PRESSURE**	**BALANCE CHAMBER**
BICP:	X	RVE:	X	BPA:	X	PA: X	MSBK1: X
BPA:	X	RVVB:	X	BPAIMP_S:	X	PA_S: X	MSBK2: X
BPV:	X	VABK1:	OPEN/CLOSED	BPA_FLOW:	X	PV: X	VABK1_S: OPEN/CLOSED
EP:	X	VDABK1:	OPEN/CLOSED	BPA_COVER:	OPEN/CLOSED	PV_S: X	VDABK1_S: OPEN/CLOSED
FPA:	X	VEBK1:	OPEN/CLOSED	BPV:	X	PBE: X	VEBK1_S: OPEN/CLOSED
FPE:	X	VDEBK1:	OPEN/CLOSED	BPVIMP_S:	X	PBS: X	VDEBK1_S: OPEN/CLOSED
KP:	X	VABK2:	OPEN/CLOSED	BPV_COVER:	OPEN/CLOSED	PBS_S: X	VABK2_S: OPEN/CLOSED
UFP:	X	VDABK2:	OPEN/CLOSED	EP:	X	PDA: X	VDABK2_S: OPEN/CLOSED
HEATER		VEBK2:	OPEN/CLOSED	FPE:	X	PDA_S: X	VEBK2_S: OPEN/CLOSED
H:	X	VDEBK2:	OPEN/CLOSED	FPA:	X	PE: X	VDEBK2_S: OPEN/CLOSED
SAD		VBP:	OPEN/CLOSED	UFP_S:	X	**LEVEL**	**COUPLINGS**
SAD_LEVEL:	X	VDE:	OPEN/CLOSED	UFP_FLOW:	X.X	NSVB: HIGH/MIDDLE/LOW	BIC_SS: OPEN/CLOSED
ACTIONS		VDA:	OPEN/CLOSED	UFP_FLOW_S:	X.X	LAFS: HIGH/MIDDLE/LOW	K_SS: OPEN/CLOSED
LEAKTEST:	ON/OFF	VD	OPEN/CLOSED	BICP_S:	X	**TEMPERATURE**	SBS1: OPEN/CLOSED
EMPTYING:	ON/OFF	VZ:	OPEN/CLOSED	BICP_FLOW:	X.X	TSE XX.X	SBS2: OPEN/CLOSED
BL_LAMP_T:	ON/OFF	VLA:	OPEN/CLOSED	BICP_FLOW_S:	X.X	TSBIC XX.X	BICKARTS: OPEN/CLOSED
SAD_TEST:	ON/OFF	VDFF:	OPEN/CLOSED	KP_S:	X	TSD XX.X	BICKARTS_S: OPEN/CLOSED
		VSB:	OPEN/CLOSED	KP_FLOW:	X.X	TSD_S XX.X	**CONDUCTIVITY**
		VBE	OPEN/CLOSED	KP_FLOW_S:	X.X	**VALVE**	BICLF: X.XX
		VSAE:	OPEN/CLOSED	HP_POS:	X.X	VBP_S: OPEN/CLOSED	ENDLF X.XX
		VSAA:	OPEN/CLOSED	HPKOLB:	ON/OFF	VDE_S: OPEN/CLOSED	ENDLF_S X.XX
				HPKRALLO:	OPEN/CLOSED	VDA_S: OPEN/CLOSED	**STATUS**
AUTOMATIC TEST & CALIBRATION				**BLOOD LEAK**		VD_S OPEN/CLOSED	RDA: NO BLOOD/BLOOD
LF: X.XX	PA: X			BLCON: X.XXX		VZ_S: OPEN/CLOSED	RDA_S NO BLOOD/BLOOD
TSD: X.X	PDA: X			BLCON_S: X.XXX		VLA_S: OPEN/CLOSED	RDV: NO BLOOD/BLOOD
TSE: X.X				**SAD**		VDFF_S: OPEN/CLOSED	RDV_S NO BLOOD/BLOOD
WORKING TIME COUNTER				SAD_LEVEL: XX		VSB_S: OPEN/CLOSED	**POWER**
WTC: X				SAD_LEV_S: X.XXX		VBE_S: OPEN/CLOSED	B24VOFF: ON/OFF
FREE MEMORY (Mb)				SAD: AIR/BLOOD		VSAE_S: OPEN/CLOSED	D24VOFF: ON/OFF
XXXX [XX.X-XX.XX] Mb				SAD_S: AIR/BLOOD		VSAA_S: OPEN/CLOSED	

LLC STATUS: 00000000 0000000

LLS STATUS: 00000000

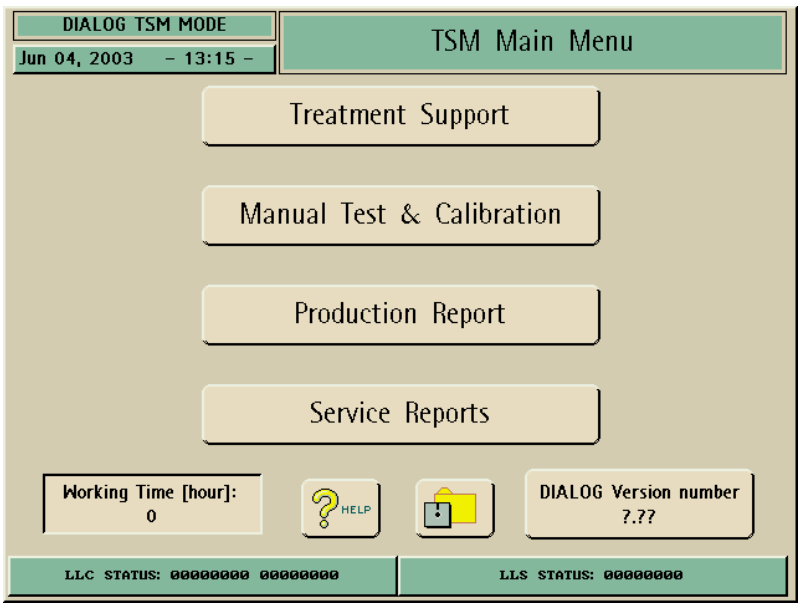
Fig.: Service Overview in TSM Mode

4.6.1 Legend Service Overview in TSM Service Program

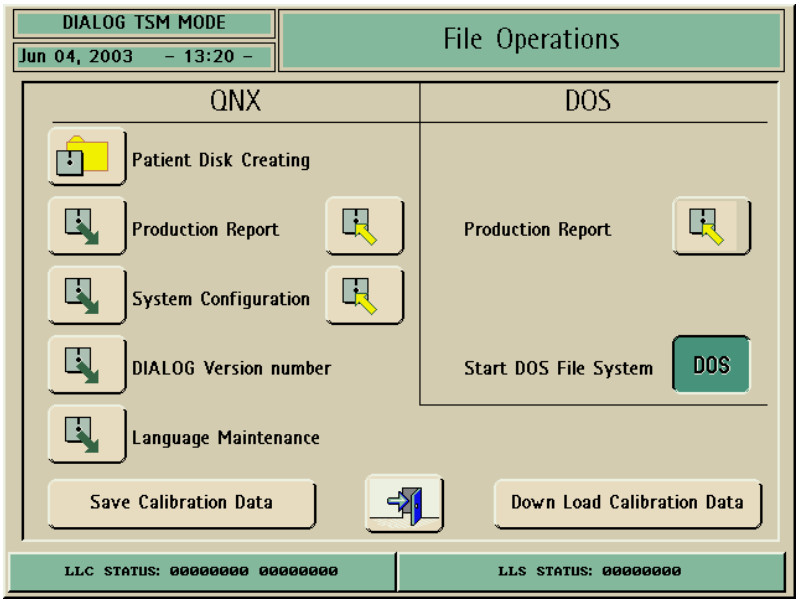
B24VOFF:	24 V cut-off blood side (HP, BPA, BPV)
BIC_SS:	Bicarbonate rinsing connector sensor
BICKART:	Bicarbonate cartridge
BICKART_S:	Bicarbonate cartridge supervisor
BICLF:	Bicarbonate conductivity
BICP:	Bicarbonate pump
BICP_FLOW:	Bicarbonate pump flow
BICP_FLOW_S:	Bicarbonate pump flow supervisor
BICP_S:	Bicarbonate pump supervisor
BL_LAMP_T:	Blood leak detector lamp test
BLCON:	Blood leak detector
BLCON_S:	Blood leak detector supervisor
BPA:	Arterial blood pump
BPA_COVER:	Arterial blood pump cover
BPA_FLOW:	Arterial blood pump flow
BPAIMP_S:	Arterial blood pump pulse supervisor
BPV:	Venous blood pump
BPV_COVER:	Venous blood pump cover
BPVIMP_S:	Venous blood pump pulse supervisor
D24VOFF:	24 V cut-off dialysate side (VDA, VDE)
EMPTYING:	Emptying
ENDLF	End conductivity
ENDLF_S	End conductivity supervisor
EP:	Degassing pump
FPA:	Outlet flow pump
FPE:	Inlet flow pump
Free Memory	Free RAM memory (DIMM/SIMM)
H:	Heater
HP_POS:	Heparin pump drive position
HPKOLB:	Heparin pump plate sensor
HPKRALLO:	Heparin pump claws
K_SS:	Concentrate rinsing connector sensor
KP:	Concentrate pump
KP_FLOW:	Concentrate pump flow
KP_FLOW_S:	Concentrate pump flow supervisor
KP_S:	Concentrate pump supervisor
LAFS:	Air separator level sensors
LEAKTEST:	Leakage test
LF:	Conductivity sensor
LLC STATUS	Alarm messages low level controller
LLS STATUS	Alarm messages low level supervisor
MSBK1:	Membrane position sensor balance chamber 1
MSBK2:	Membrane position sensor balance chamber 2
NSVB:	Level sensor upline tank
PA:	Arterial pressure sensor
PA_S:	Arterial pressure sensor supervisor
PBE:	Blood inlet pressure sensor
PBS:	Blood control pressure sensor
PBS_S:	Blood control pressure sensor supervisor
PDA:	Dialysate outlet pressure sensor
PDA:	Dialysate outlet pressure sensor
PDA_S:	Dialysate outlet pressure sensor supervisor
PE:	Degassing pressure sensor
PV:	Venous pressure sensor
PV_S:	Venous pressure sensor supervisor

RDA:	Arterial red detector
RDA_S	Arterial red detector supervisor
RDV:	Venous red detector
RDV_S	Venous red detector supervisor
RVE:	Degassing control valve
RVVB:	Upline tank control valve
SAD:	Safety air detector
SAD_LEV_S:	Safety air detector supervisor level (voltage)
SAD_LEVEL:	Safety air detector level
SAD_LEVEL:	Safety air detector level (digits)
SAD_S:	Safety air detector supervisor
SAD_TEST:	Safety air detector test
SBS1:	Rinsing bridge connector sensor 1
SBS2:	Rinsing bridge connector sensor 2
TSBIC	Bicarbonate temperature sensor
TSD:	Dialysate temperature sensor
TSD_S	Dialysate temperature sensor supervisor
TSE:	Degassing temperature sensor
UFP:	Ultrafiltration pump
UFP_FLOW:	Ultrafiltration pump flow
UFP_FLOW_S:	Ultrafiltration pump flow supervisor
UFP_S:	Ultrafiltration pump supervisor
VABK1:	Outlet valve balance chamber 1
VABK1_S:	Outlet valve balance chamber 1 supervisor
VABK2:	Outlet valve balance chamber 2
VABK2_S:	Outlet valve balance chamber 2 supervisor
VBE:	Filter vent valve
VBE_S:	Vent filter valve supervisor
VBP:	By-pass valve
VBP_S:	By-pass valve supervisor
VD	Disinfection valve
VD_S	Disinfection valve supervisor
VDA:	Dialyser outlet valve
VDABK1:	Dialyser outlet valve balance chamber 1
VDABK1_S:	Dialyser outlet valve balance chamber 1 supervisor
VDABK2:	Dialyser outlet valve balance chamber 2
VDABK2_S:	Dialyser outlet valve balance chamber 2 supervisor
VDA-S:	Dialyser outlet valve supervisor
VDE:	Dialyser inlet valve
VDEBK1:	Dialyser inlet valve balance chamber 1
VDEBK1_S:	Dialyser inlet valve balance chamber 1 supervisor
VDEBK2:	Dialyser inlet valve balance chamber 2
VDEBK2_S:	Dialyser inlet valve balance chamber 2 supervisor
VDE-S:	Dialyser inlet valve supervisor
VDFF:	DF filter valve
VDFF_S:	DF filter valve supervisor
VEBK1:	Inlet valve balance chamber 1
VEBK1_S:	Inlet valve balance chamber 1 supervisor
VEBK2:	Inlet valve balance chamber 2
VEBK2_S:	Inlet valve balance chamber 2 supervisor
VLA:	Air separator valve
VLA_S:	Air separator valve supervisor
VSAA:	Substitution outlet valve
VSAA_S:	Substitution outlet valve supervisor
VSAE:	Substitution inlet valve
VSAE_S:	Substitution inlet valve supervisor
VSB:	Substitution bypass valve
VSB_S:	Substitution bypass valve supervisor
VZ:	Circulation valve
VZ_S:	Circulation valve supervisor
WTC:	Working time counter

4.7 File Operations SW < 6.20



1. Set TSM service program mode on supervisor board: hardware switch K1, position 2.
2. Switch on Dialog.
3. Activate the *File Operations* menu with the *Diskette* icon in menu *TSM Main Menu*.



The *File Operations* menu is displayed. The following parameters can be selected:

QNX 2 File Operations
- Patient Disk Creating
- Production Report
- System Configuration
- Dialog Version Number
- Language Maintenance

DOS File Operations
- Production Report
- Start DOS File System

Save Calibration Data Low Level Controller (LLC)
Down Load Calibration Data Low Level Controller (LLC)

4.7.1 QNX File Operations

Patient Disk Creating

You can format a QNX diskette with the icon. The patient name is checked on the diskette. Thus it is guaranteed that other patient diskettes are not overwritten.

1. Insert a non-formatted diskette or DOS formatted diskette into floppy disk drive.
2. Select *Diskette* icon.
3. Format QNX diskette.

Production Report

You can load a production report from a diskette or save the production report to a diskette.

1. Insert an empty QNX diskette or a diskette with the production report into floppy disk drive.
2. Select *Diskette* icon.
3. Load or store the production report.

System Configuration

You can load the basic setting TSM/therapy from diskette or save the basic setting TSM/therapy to a diskette.

A diskette with the system configuration from an other machine can only be used if the hardware, the software and the operating system (QNX2 or QNX4) match.

1. Insert an empty QNX diskette or a diskette with the system configuration into floppy disk drive.
2. Select *Diskette* icon.
3. Load or store the system configuration.

Dialog Version Number

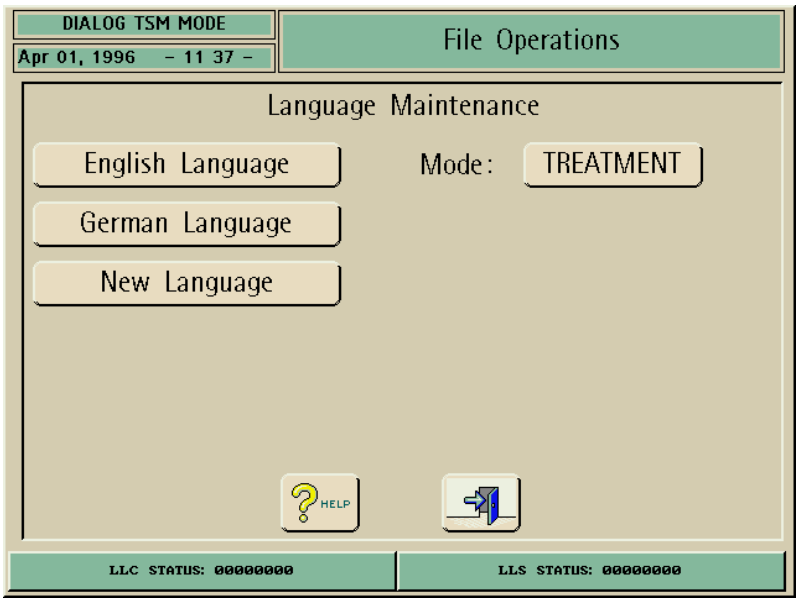
You can load a new Dialog version no., e.g. due to a controller software update.

1. Insert Dialog version number diskette into floppy disk drive.
2. Select *Diskette* icon.
3. Load new version number.

Language Maintenance

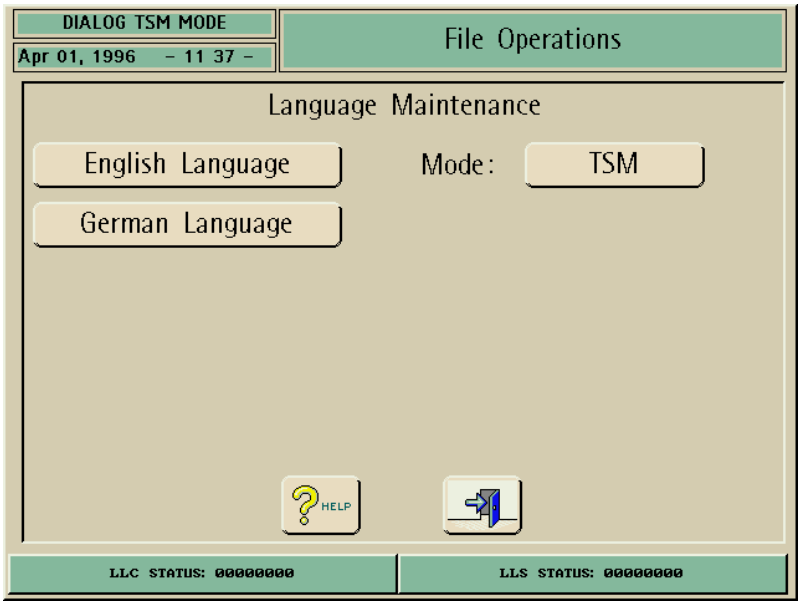
You can load or supplement a new language for therapy or TSM service program.

Language for Treatment



1. Insert language diskette into floppy disk drive.
2. Select *Diskette* icon.
3. Select the *English Language*, *German Language* or the *New Language* button to install the appropriate language.

Language for TSM Service Program



1. Select TSM with the *Mode* button.
2. Insert language diskette into floppy disk drive.
3. Select the *English Language* or the *German Language* button to install the appropriate language.

4.7.2 DOS File Operations

STK Report

This function is not supported.

Production Report

You can save the production report to a DOS diskette. The DOS compatible file name has eight characters, for the serial number of the specific Dialog unit and *prd* file recognition. File name, date, year and time are protocolled in the report.
Example file name:
Dialog Serial No.: 2001 File Name: 00002001.prd

1. Insert DOS diskette into floppy disk drive.
2. Select *Diskette* icon.
3. Save production list to diskette.

4.7.3 Calibration Data Operations

Save Calibration Data Low Level Controller LLC

The calibration data must be saved to the hard disk drive by LLC/LLS after every calibration.

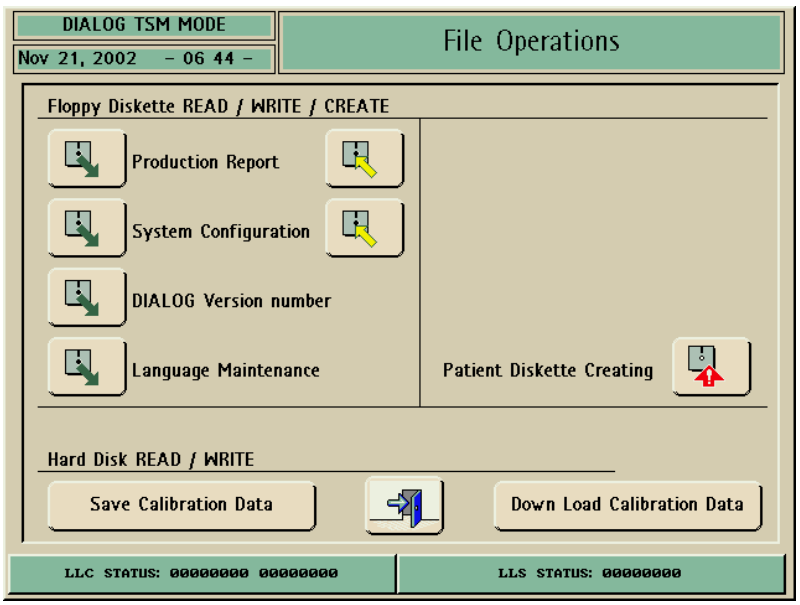
Down Load Calibration Data Low Level Controller LLC

The LLC calibration data can be downloaded from the hard disk drive to the exchanged controller board LLC.

Note Exchange Supervisor Board

The procedure for the exchange of a supervisor board is different (details see chapter 3 repair instructions).

4.8 File Operations SW ≥ 6.20



The *File Operations* menu is selected with the *Diskette* icon in the *TSM* main menu.

Note

The format for patient diskettes and configuration diskettes (TSM) now have DOS format, i.e. are not compatible with QNX 2 (SW < 6.20) diskettes.

From QNX 4 special diskettes for the QNX operating system do not have to be generated. The diskettes for file operation are DOS compatible, i.e. can be used in a PC with a DOS/Windows operating system.

The following parameters can be selected:

Floppy Diskette Read/Write/Create

- Production Report
- System Configuration
- Dialog Version Number
- Language Maintenance
- Patient Diskette Creating

Hard Disk Read/Write

- Save Calibration Data
- Down Load Calibration Data

4.8.1 Floppy Diskette Operations

Production Report

You can load a production report from a diskette or save the production report to diskette.

1. Insert a formatted DOS diskette or a diskette with the production report into floppy disk drive.
2. Select *Diskette* icon.
3. Load or store the production report.

System Configuration

You can load the basic setting TSM/therapy from diskette or save the basic setting TSM/therapy to diskette.

A diskette with the system configuration from an other machine can only be used if the hardware, the software and the operating system (QNX2 or QNX4) match.

1. Insert a formatted DOS diskette or a diskette with the system configuration into floppy disk drive.
2. Select floppy disc icon.
3. Load or store the basic setting.

Dialog Version Number

You can load a new Dialog version no., e.g. due to a controller software update

1. Insert Dialog version number diskette into floppy disk drive.
2. Select *Diskette* icon.
3. Load new version number.

Patient Diskette Creating

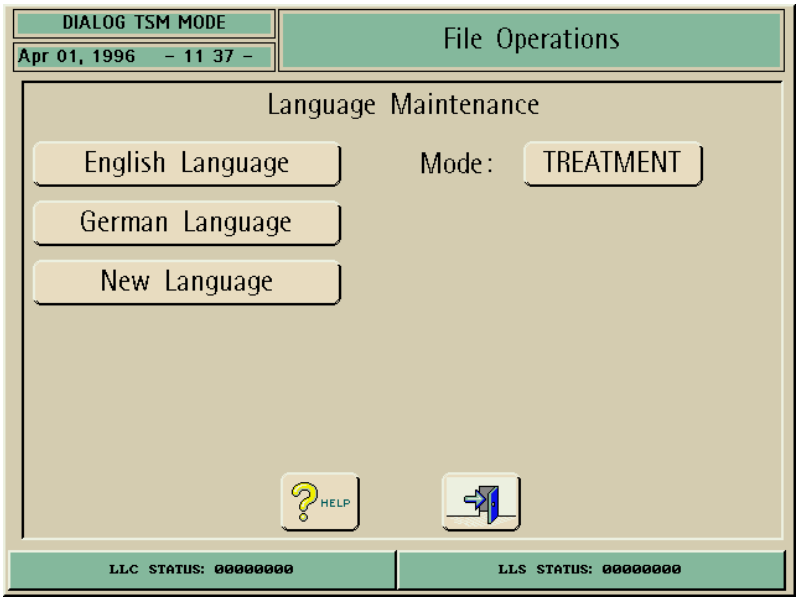
You can create a patient diskette (DOS).

1. Insert DOS formatted diskette into floppy disk drive.
2. Select *Patient Diskette Creating* icon.
   A DOS formatted patient diskette is created.

Language Maintenance

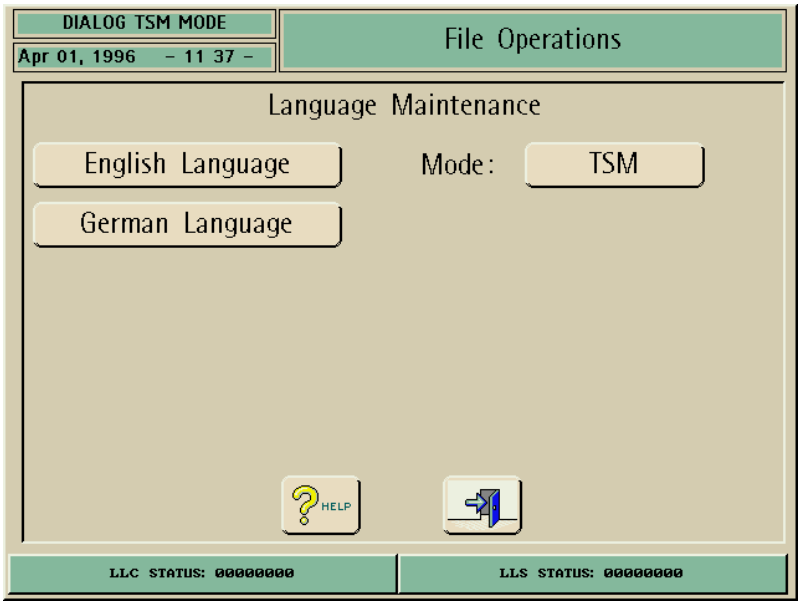
You can load or supplement a new language for therapy or for the TSM service program.

Language for Treatment



1. Insert language diskette into floppy disk drive.
2. Select *Diskette* icon.
3. Select the *English Language*, *German Language* or the *New Language* button to install the appropriate language.

Language for TSM Service Program



1. Select TSM with the *Mode* button.
2. Insert language *Diskette* into floppy disk drive.
3. Select the *English Language* or the *German Language* button to install the appropriate language.

4.8.2 Calibration Data Operations

Save Calibration Data Low Level Controller LLC

The calibration data must be saved to the hard disk drive by LLC/LLS after every calibration.

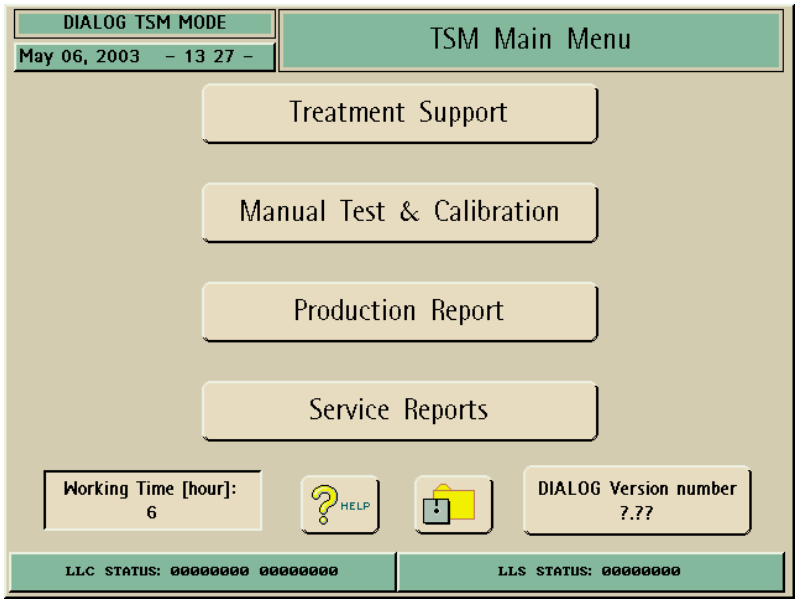
Down Load Calibration Data Low Level Controller LLC

The LLC calibration data can be downloaded from the hard disk drive to the exchanged controller board LLC.

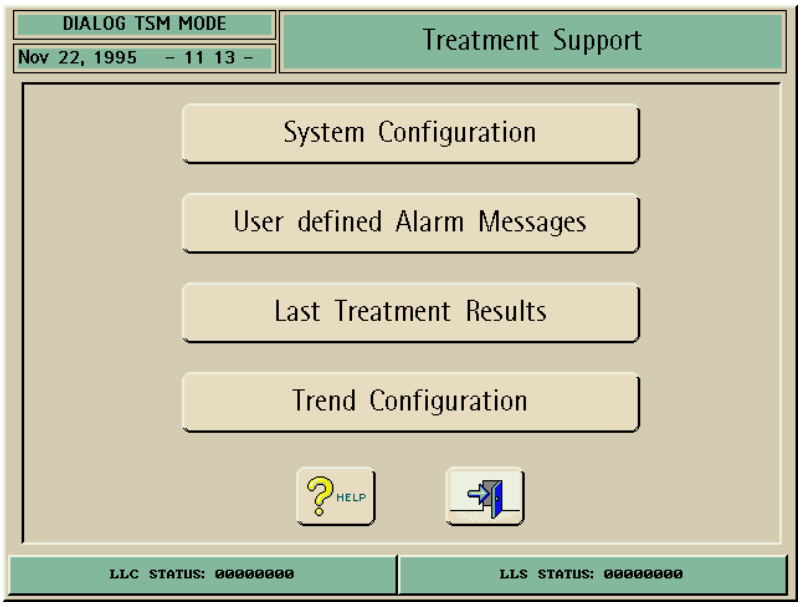
Note Exchange Supervisor Board

The procedure for the exchange of a supervisor board is different (details see chapter 3 repair instructions).

4.9 Treatment Support



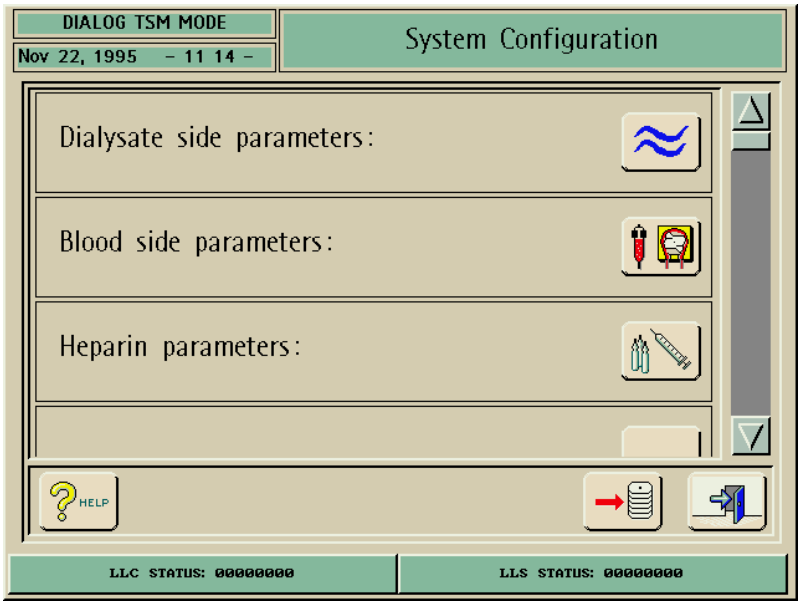
1. Activate the *Treatment Support* menu with the *Treatment Support* button in menu *TSM Main Menu*. The following menu is opened.



Four sub-menus can be selected in the *Treatment Support* menu.

System Configuration	This is a special editor to set the configuration of the treatment mode (e.g. limits, default values). The new settings are valid after the restart of the machine.
User Defined Alarm Messages	Every alarm message has of two parts. The first *Fix Alarm* message is a noneditable alarm description. The second *User Alarm* message can be edited by the user for additional remarks (only available in some SW versions).
Last Treatment Results	You can select and define the configuration of the trends displayed in treatment mode. The stored data of the last treatment can be displayed with the second function.
Trend Configuration	There are five trend groups, which can be selected for the treatment program. Every group has three treatment parameters.

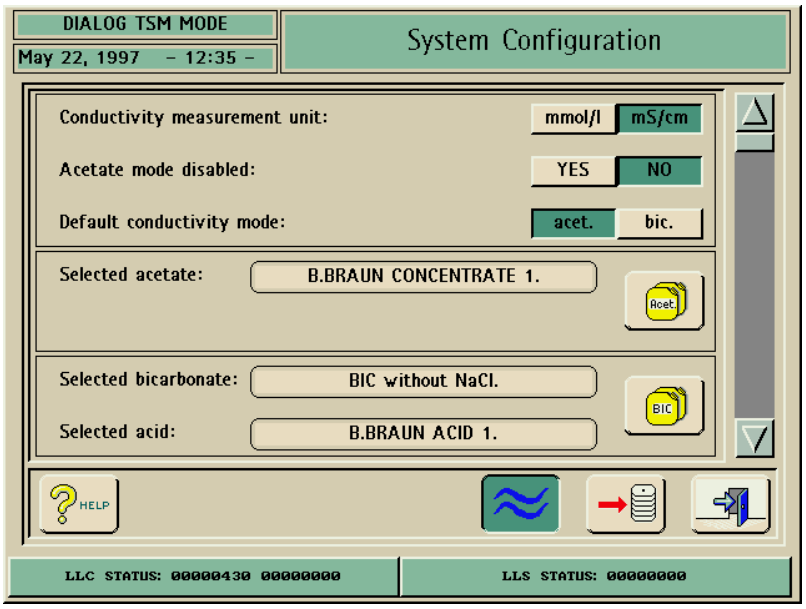
4.9.1 System Configuration



1. Activate the *System Configuration* menu with the *System Configuration* button in menu *Treatment Support*.
   The following menu is opened.

Scroll the various system configuration points up or down with the scroll bar. System configuration points can be selected (additional settings are activated if specific options are selected).

4.9.1.1 Dialysate Side Parameters



The dialysate fluid parameters can be set in the *Dialysate Side Parameters* menu.

1. Activate the *Dialysate Side Parameters* menu with the *Dialysate Side Parameters* icon. The following menu is opened.

The following parameters can be set:

- Conductivity measurement unit
- Acetate mode disabled
- Default conductivity mode
- Selected acetate (only necessary if mmol/l is selected)
- Selected bicarbonate/selected acid (only necessary if mmol/l is selected)
- Temperature measurement unit
- Dialysate flow
- Dialysate temperature

Conductivity Measurement Unit

You can either select conductivity [mS/cm] or sodium concentration [mmol/l] for the conductivity measurement unit. If sodium concentration [mmol/l] is selected a corresponding conversion factor must be entered. Activate the *ACET* or *BIC* icon to enter the corresponding conversion factor.

1. Click the *mmol/l* or *mS/cm* button to select a measurement unit.

Acetate Mode Disabled

The acetate mode can be disabled.

1. Click the *YES* button to disable the acetate mode.

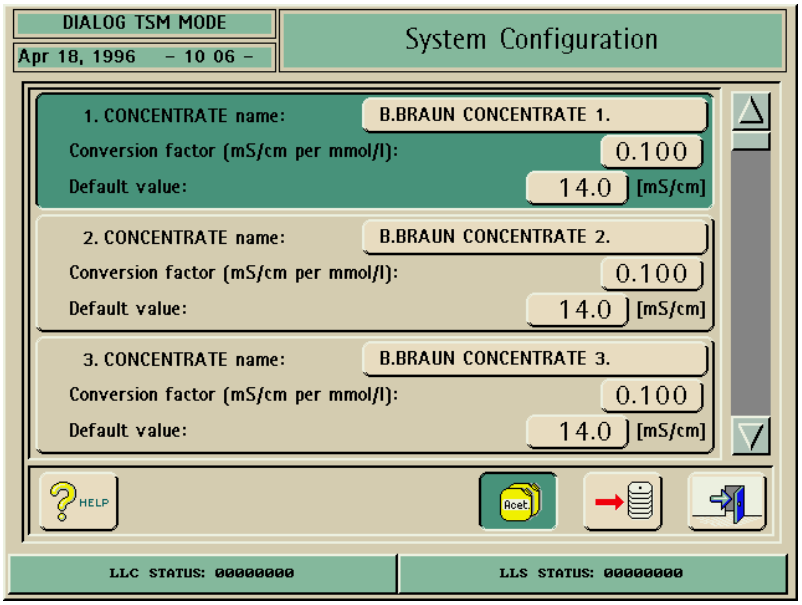
Default Conductivity Mode

The bicarbonate dialysis is the standard factory setting. You can preselect either acetate or bicarbonate for the standard dialysis operation mode.

1. Click either the *Bic* or *Acet* button for the standard setting.

Selected Acetate

You can enter up to 10 acetate concentrate names and the conversion factors for the conversion of conductivity values for concentrate of sodium ions. You can activate a concentrate for therapy by pressing a free section of the window.



1. Click the *Acet* icon to activate the selected acetate. The following menu is opened.
2. Click the *Concentrate* window to enter or to edit a concentrate name. This name is displayed in therapy mode.
3. Click the *Conversion* window if necessary to enter or to change the conversion factor [mS/cm per mmol/l].

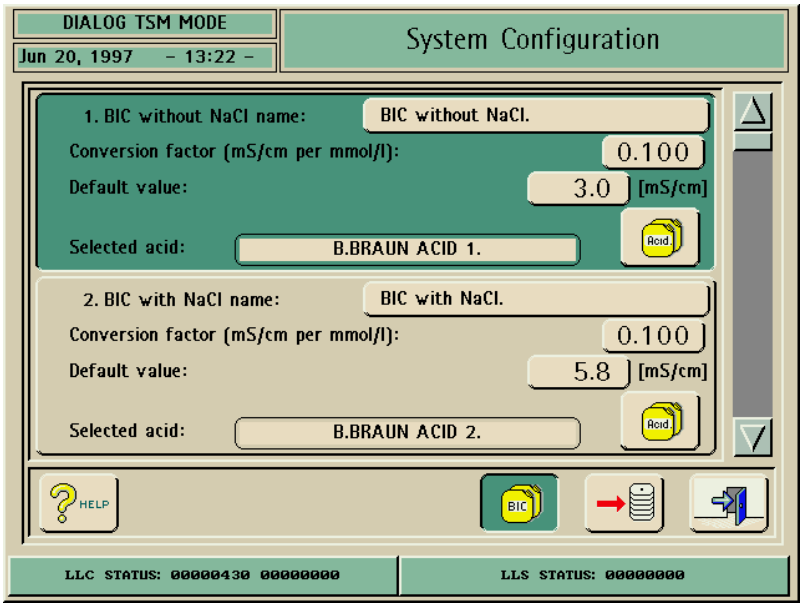
   Conversion Factor:

$$\frac{\text{Conductivity Value LF (Standard Value)}}{\text{Measured Value (NaCl Concentration)}} = \text{Conversion Factor}$$

4. Click the *Default Value* window if you want to change the value [mS/cm].

Selected Bicarbonate/Selected Acid

You can activate a window for *BIC without* or *with NaCl* by pressing a free section of the window. You can select the current bicarbonate type with or without NaCl:



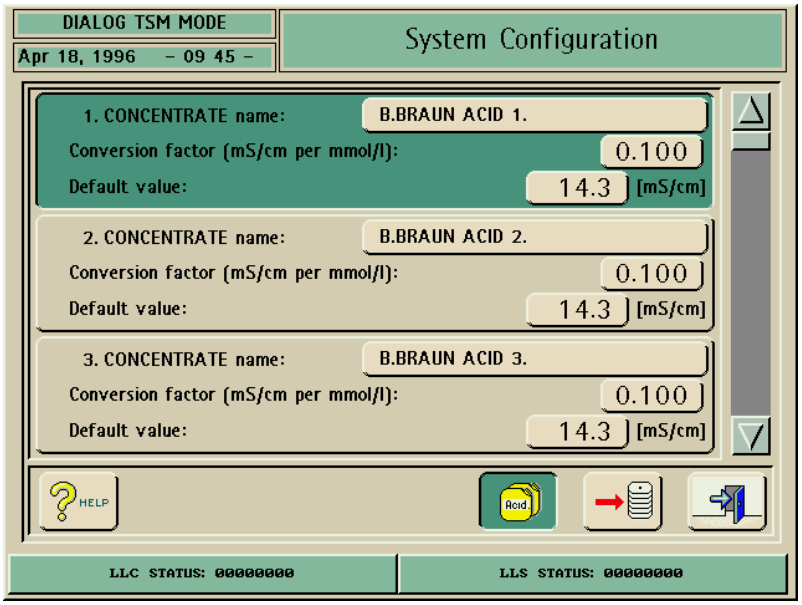
- Bicarbonate without NaCl (2 - 4 mS/cm)
- Bicarbonate with NaCl (4 - 7 mS/cm)

Do not activate *Bicarbonate with NaCl* if the BIC cartridge holder option is installed and applied.

This setting is used in therapy. If necessary you can set the name and the conversion factor [mS/cm per mmol/l] for the applied bicarbonate type.

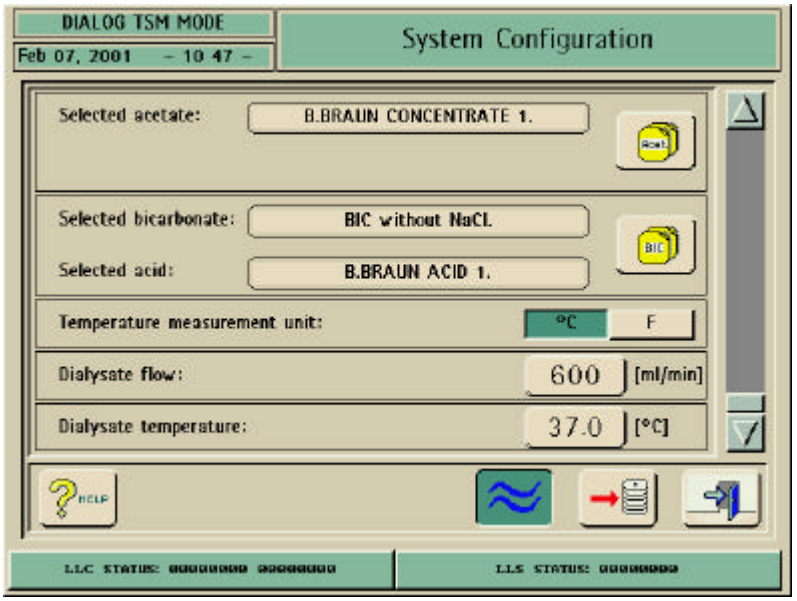
1. Click the *BIC* icon to activate the selected bicarbonate.

   The following menu is opened.
2. Click the *Bicarbonate* window to enter or to edit a bicarbonate name.
3. Click the *Conversion* window if necessary to enter or to change the conversion factor [mS/cm per mmol/l].
4. You can select the current acetate concentrate. Enter the name and the conversion factor [mS/cm per mmol/l] for the different acetate concentrates.
5. The conversion factor is calculated like acetate.



6. Click the *Default Value* window to change the value [mS/cm].
   - BIC without NaCl
   - BIC with NaCl
7. Click the *Acid* icon to activate the selected acid. The following menu is opened. You can enter 10 concentrate names and conversion factors respectively. The selected concentrate name is displayed in the *Concentrate Name* window.
8. Click the *Default Value* window if you want to change the value [mS/cm].

Temperature Measurement Unit



You can set the current measurement unit of the temperature.

1. Activate the *Dialysate Side Parameters* menu with the *Dialysate Side Parameters* icon.
2. Click the *°C* or *F* button to select and activate the measurement unit.

Dialysate Flow

You can preset the dialysate flow for therapy.

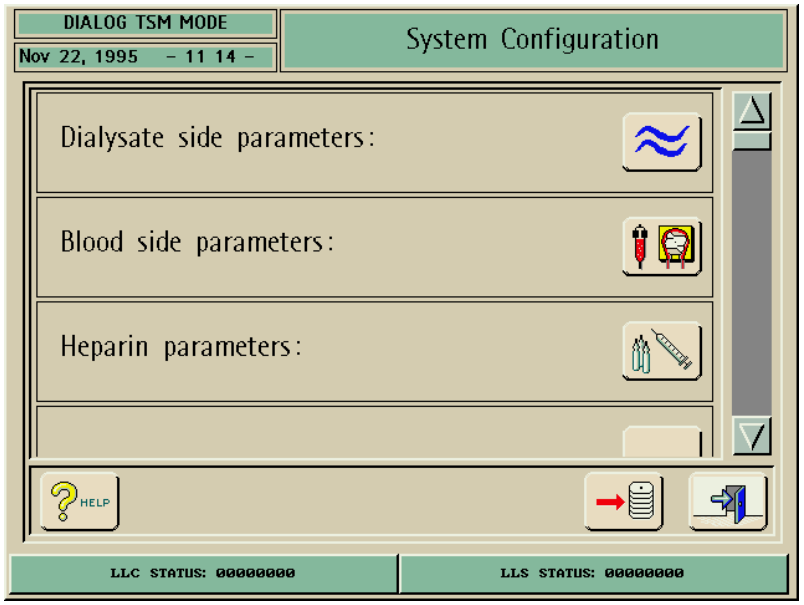
1. Click the *ml/min* button to set the dialysate flow.

Dialysate Temperature

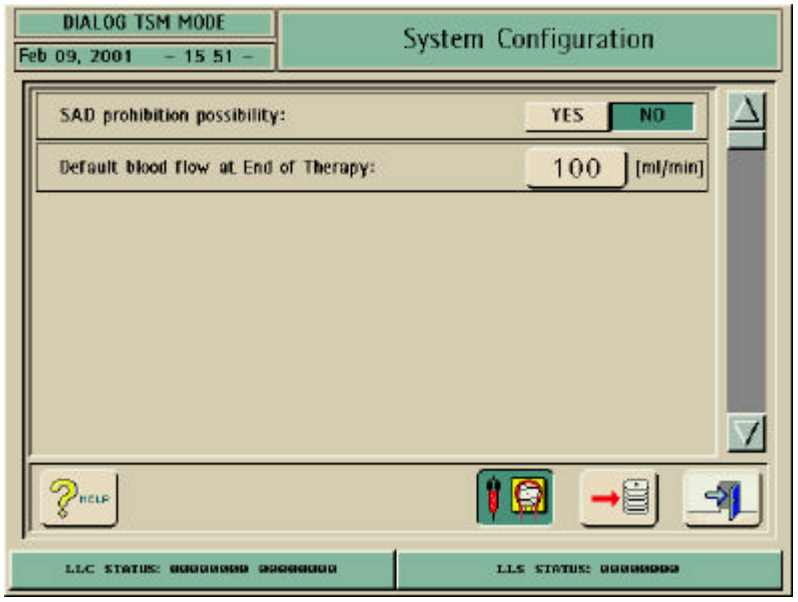
You can set the dialysate temperature for therapy.

1. Click the *°C* button to set the dialysate temperature.

4.9.1.2 Blood Side Parameters



1. Activate the *System Configuration* menu with the *System Configuration* button in menu *Treatment Support*. Use the scroll bar until the following menu appears.



2. Activate the *Blood Side Parameters* menu with the *Blood Side* icon. The following menu is opened.

The following parameters can be set:

- SAD prohibition possibility
- Default Blood Flow at End of Therapy

SAD Prohibition Possibility

You can activate the SAD prohibition with the *YES* button, during the disconnection phase of the patient, i.e. the SAD alarm is suppressed during this procedure and the blood pump can be started.

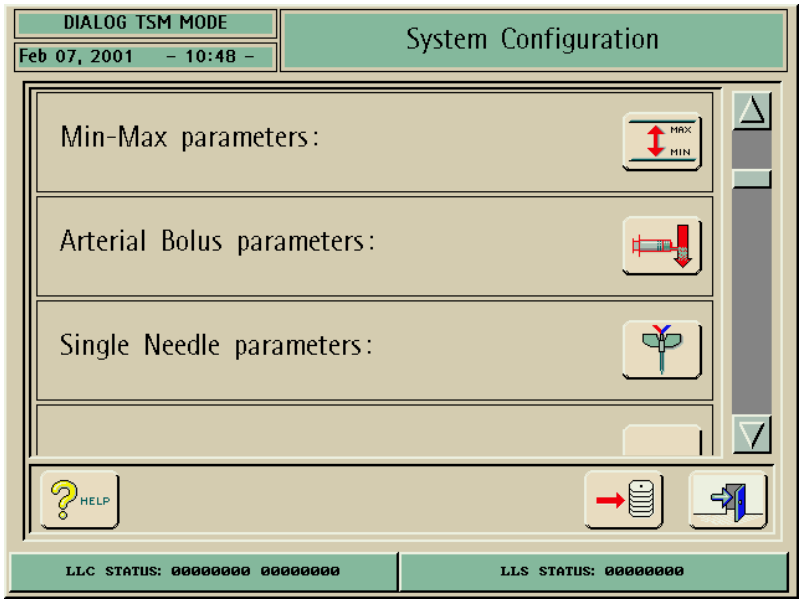
1. Click the *YES* or *NO* button to set the SAD prohibition possibility.

Default Blood Flow at End of Therapy

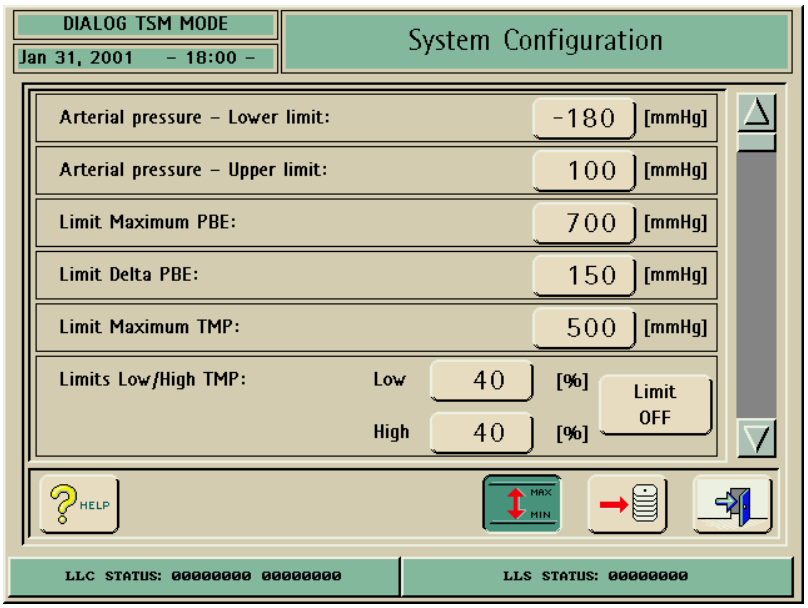
You can preselect the blood flow which will be preset at the end of a threapy.

1. Click the *ml/min* button to set the default blood flow at the end of a therapy.

4.9.1.3 Min-Max Parameters



1. Activate the *System Configuration* menu with the *System Configuration* button in menu *Treatment Support*. Use the scroll bar until the following menu appears.


DIALOG TSM MODE
Jan 31, 2001 - 18:00 -
System Configuration
Arterial pressure – Lower limit: -180 [mmHg]
Arterial pressure – Upper limit: 100 [mmHg]
Limit Maximum PBE: 700 [mmHg]
Limit Delta PBE: 150 [mmHg]
Limit Maximum TMP: 500 [mmHg]
Limits Low/High TMP: Low 40 [%] Limit OFF
High 40 [%]
HELP
LLC STATUS: 00000000 00000000
LLS STATUS: 00000000

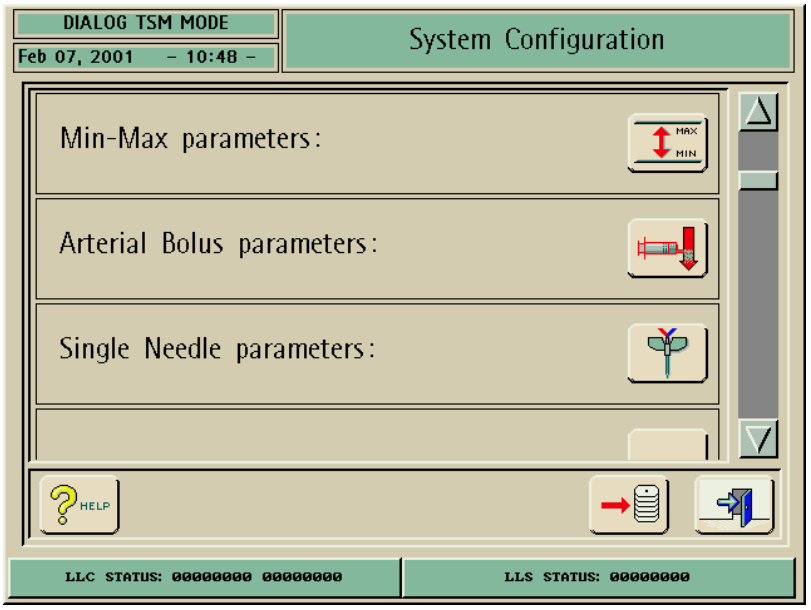
2. Activate the *Min-Max Parameters* menu with the *MIN-Max* icon. The following menu is opened.

The following parameters can be set in the *Min-Max Parameters* menu:

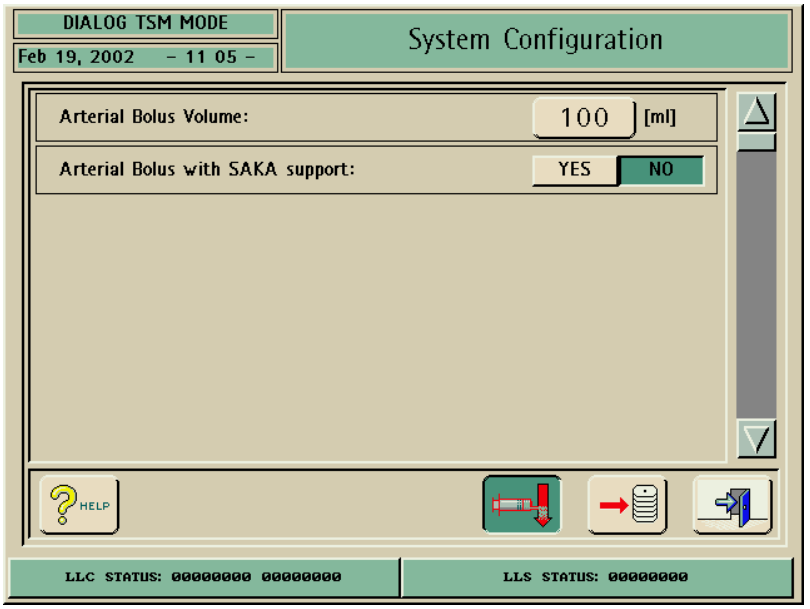
- Arterial Pressure - Lower Limit
- Arterial Pressure - Upper Limit
- Limit Maximum PBE
- Limit Delta PBE
- Limit Maximum TMP
- Limits Low/High TMP

Arterial Pressure - Lower Limit	You can set the lower limit for the arterial pressure in therapy. Only for the LLC: the set range depends on the setting of the absolute lower limit value of PA (menu: *LLC Manual Calibration/2.12 PV Alarm Window, PA Absolute Low Limit/PA Absolute Low Limit*).
Arterial Pressure - Upper Limit	You can set the upper limit for the monitoring of the arterial pressure in therapy.
Limit Maximum PBE	You can set the maximum limit for the monitoring of the PBE in therapy.
Limit Delta PBE	You can set the permissible changes for PBE during therapy.
Limit Maximum TMP	You can set the upper limit for TMP for the monitoring in therapy.
Limits Low/High TMP	The lower and upper limit can be set in % for TMP monitoring in therapy. Limit OFF activated: Monitoring is not performed Limit OFF deactivated: Monitoring is performed

4.9.1.4 Arterial Bolus Parameters



1. Activate the *System Configuration* menu with the *System Configuration* button in menu *Treatment Support*. Use the scroll bar until the following menu appears.



2. Activate the *Arterial Bolus Parameters* menu with the *Arterial Bolus* icon. The following menu is opened.

The following parameters can be set in the *Arterial Bolus Parameters* menu:

- Arterial Bolus Volume
- Arterial Bolus with SAKA Support

Arterial Bolus Volume

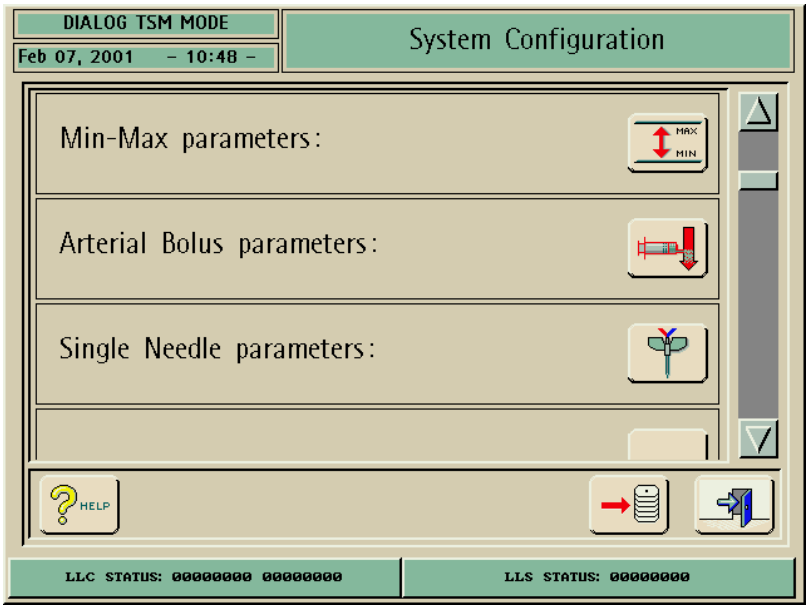
The volume for an arterial bolus can be set.

Arterial Bolus with SAKA Support

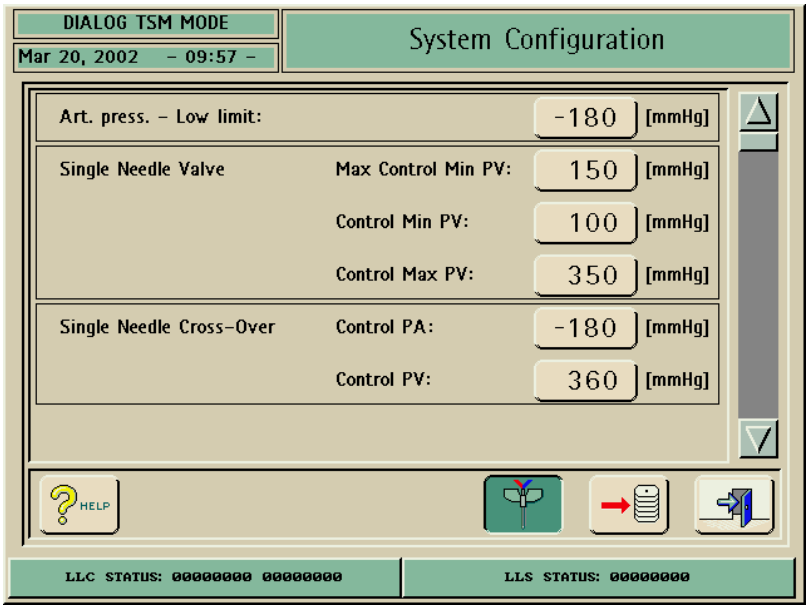
The arterial tubing clamp SAKA can be used to support an arterial bolus in the *Arterial Bolus Parameters* menu. Prerequisites are:

- Arterial tubing clamp SAKA present
- An arterial line system with infusion access is present between the SAKA and blood pump

4.9.1.5 Single Needle Parameters



1. Activate the *System Configuration* menu with the *System Configuration* button in menu *Treatment Support*. Use the scroll bar until the following menu appears.


DIALOG TSM MODE
Mar 20, 2002 - 09:57 -
System Configuration
Art. press. – Low limit: -180 [mmHg]
Single Needle Valve
Max Control Min PV: 150 [mmHg]
Control Min PV: 100 [mmHg]
Control Max PV: 350 [mmHg]
Single Needle Cross-Over
Control PA: -180 [mmHg]
Control PV: 360 [mmHg]
HELP
LLC STATUS: 00000000 00000000
LLS STATUS: 00000000

2. Activate the *Single Needle Parameters* menu with the *Single Needle* icon.

The following parameters can be set:

- Arterial Pressure Low Limit
- Single Needle Valve (control pressures)
- Single Needle Cross-Over (control pressures)

Arterial Pressure Low Limit

You can set ther lower limit for the arterial pressure in therapy.
Only for LLC: The set range depends upon the setting of the absolute lower limit value of PA (menu: *LLC Manual Calibration/2.12 PV Alarm Window, PA Absolute Low Limit*)

Single Needle Valve

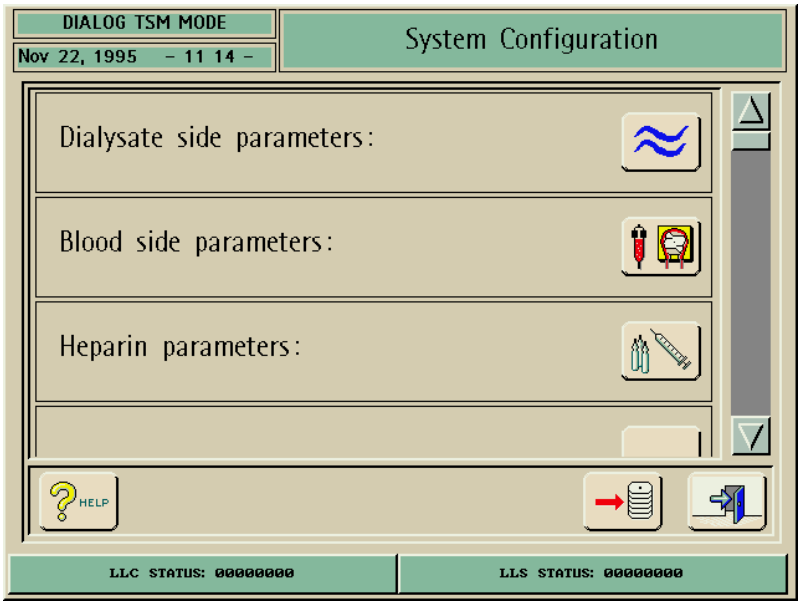
The maximum lower venous control pressure can be set for the *Single Needle Valve* option in the *Single Needle* menu.

Maximum Control Minimum PV
For safety reasons it is necessary to limit the maximum value for the lower venous controll pressure for the SN valve. The maximun setting is 150 mmHg (default setting).
If the SAKV currentless closed option is present (AAMI standard) the value can be set higher.
Furthermore the control pressure PV can be set. Thereby the blood pump is started/stopped and the venous tubing clamp SAKV is opened/closed.

Single Needle Cross-Over

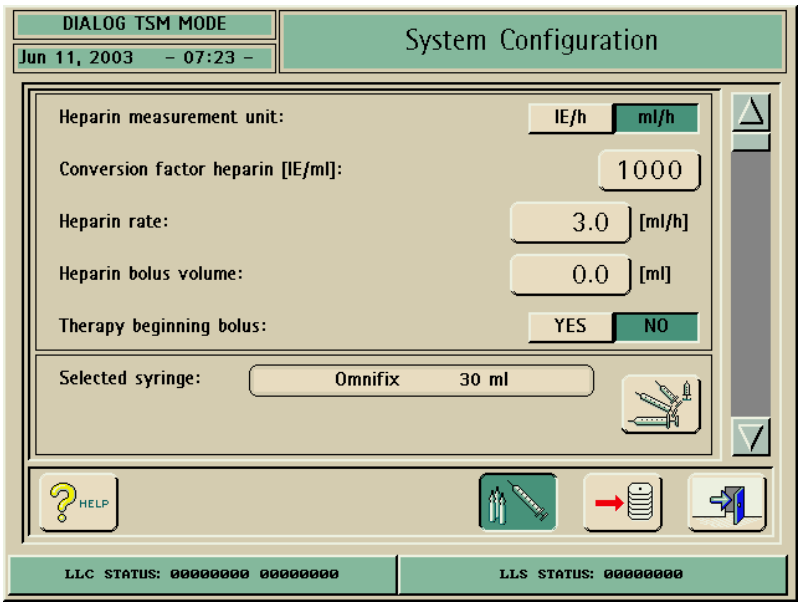
The control pressures for PA and PV can be set for single needle cross-over.

4.9.1.6 Heparin Parameters



You can set the parameters in the Heparin Parameters menu and select a syringe type.

1. Activate the *System Configuration* menu with the *System Configuration* button in menu *Treatment Support*. The following menu is opened.



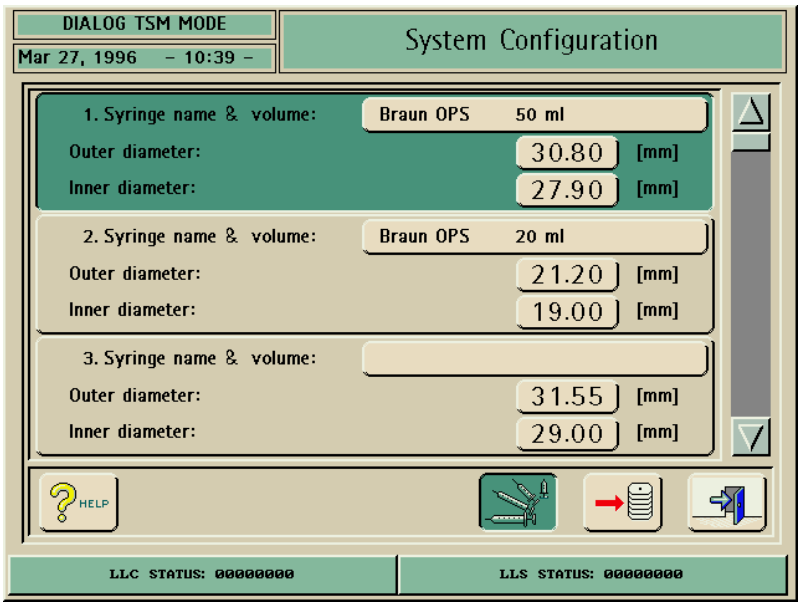
2. Activate the *Heparin Parameters* menu with the *Heparin Parameters* icon. The following menu is opened.

The following parameters can be set:

- Heparin measurement unit
- Conversion factor heparin [IE/ml]
- Heparin rate
- Heparin bolus volume
- Therapy beginning bolus
- Selected syringe

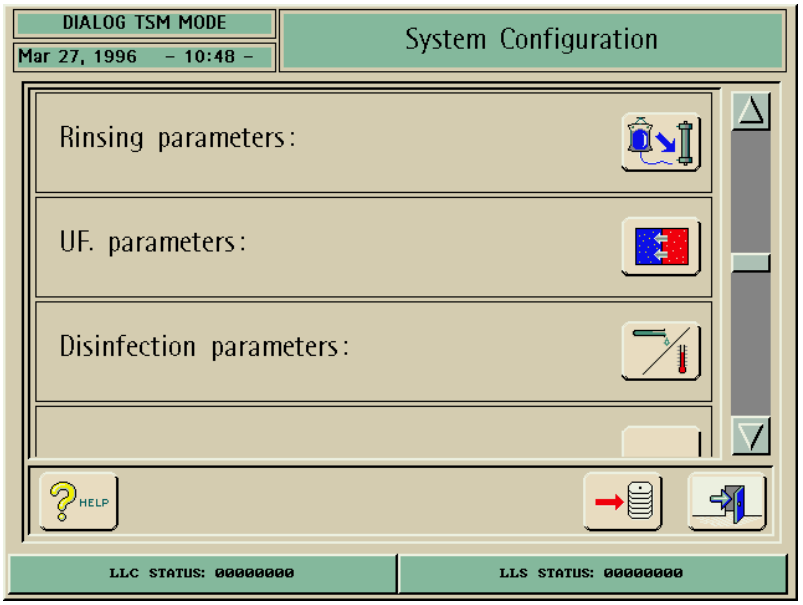
Heparin Measurement Unit	The measurement unit [IE/H] or [ml/h] can be selected for heparin.
Conversion Factor Heparin [IE/ml]	You can set the conversion factor ([IE/ML] dependimg on the mixing ratio, if the amount of heparin should be displayed in international units (IE). The conversion factor describes the quantity of IE in 1 ml solution, e.g. 1000 IE represent in 1 ml solution 1000 IE heparin.
Heparin Rate	The heparin rate can be set to [IE/h] or [ml/h], depending on the selected uint.
Heparin Bolus Volume	You can select the bolus volume for the heparin bolus.
Therapy Beginning Bolus	An automatic bolus can be administered at the bebinning of a therapy. The bolus is administered by the red sensor RDA as soon as the blood pump detects blood.

Selected Syringe	The selected syringe type is used in therapy.
Heparin Pump Comfort	You can set the syringe name and the outer and inner diameter of the syringe.
Heparin Pump Compact	You can set the syringe name and the inner diameter of the syringe.



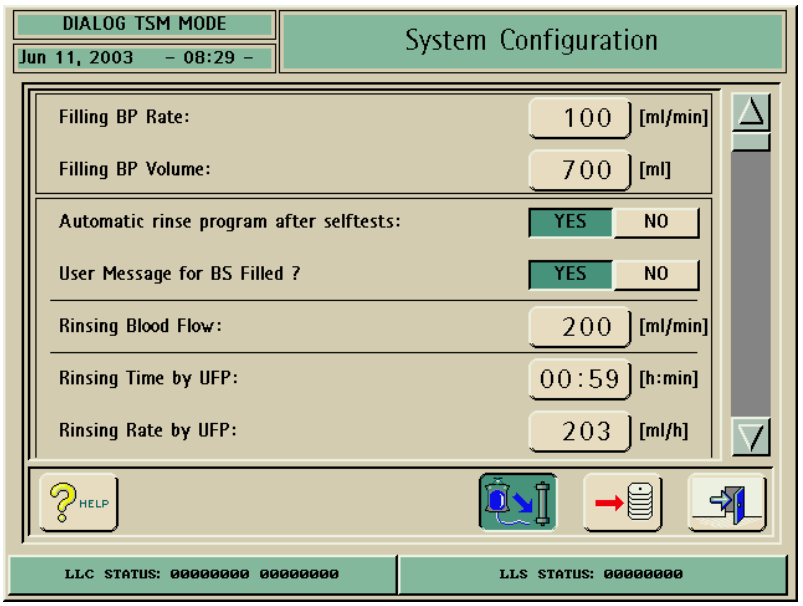
1. Activate the *Selected Syringe* menu with the *Selected Syringe* icon. The following menu is opened.

4.9.1.7 Rinsing Parameters



The *Rinsing Parameters* can be set in the *Rinsing Parameters* menu.

1. Activate the *System Configuration* menu with the *System Configuration* button in menu *Treatment Support*. The following menu is opened and displayed (scroll with scroll bar).


DIALOG TSM MODE
Jun 11, 2003 - 08:29 -
System Configuration
Filling BP Rate: 100 [ml/min]
Filling BP Volume: 700 [ml]
Automatic rinse program after selftests: YES NO
User Message for BS Filled ? YES NO
Rinsing Blood Flow: 200 [ml/min]
Rinsing Time by UFP: 00:59 [h:min]
Rinsing Rate by UFP: 203 [ml/h]
HELP
LLC STATUS: 00000000 00000000
LLS STATUS: 00000000

2. Activate the *Rinsing Parameters* menu with the *Rinsing Parameters* icon. The following menu is displayed.

The following parameters can be set:

- Filling BP rate
- Filling BP volume
- Automatic rinse program after selftests
- User message for BS filled?
- Rinsing bloood flow
- Rinsing time by UFP
- Rinsing rate by UFP
- Rinsing volume by UFP
- Rinsing time by BPA or BPV
- Rinsing rate by BPA or BPV
- Rinsing volume by BPA or BPV
- Blood Flow for connecting patient

Filling BP Rate
You can set the BP rate to fill the blood line system (BS) for all rinsing modes.

Filling BP Volume
You can set the filling/rinsing volume for the A/V system.

With Rinsing Out of Machine
The filling of the dialyser is started after the filling BP volume is reached (e.g. 300 ml).

With Bag Rinsing
The blood pump BPA is stopped after the filling BP volume is reached (e.g. 300 ml). This allows the changing from two bags to one bag.

Automatic Rinse Program after Selftests
If YES is Activated
Thr rinsing is automatically performed directly after the BS selftests.

If NO is Activated
The rinsing must be started manually after the BS selftests.

User Message for BS Filled?

If YES is Activated
The following user message is displayed after rinsing out of the machine:

Is the blood system filled with NaCl solution and rinsed?
All levels correctly set?

The BS system is filled until the ↵ key is pressed and the filling BP volume is completed. Thus the level can be set. Then the dialyser can be turned to fill the DF side.

If NO is Activated
The filling of the dialyser is automatically started after the *Filling BP Volume* is finished.

Rinsing Bloood Flow

You can set the blood flow for rinsing. After the selftests BPA delivers a longitudinal flow during rinsing. This depends on the rinsing mode.

Longitudinal rinsing (along the dialyser):
- Blood side inlet/outlet
- Water side inlet/outlet

Cross rinsing (through the dialyser membrane):
- Blood side to water side

Note
Interdependencies when changing parameters:

Change	Automatic Adaptation from
Rinsing Time	Rate
Rate	Rinsing Time
Rinsing Volume	Rate

Rinsing Time by UFP

You can set the rinsing time (for bag rinsing without substitution line (s-online)). Thus rinsing via the dialyser membrane is possible. After the termination of the rinsing time, rinsing is performed with min. UF.

Rinsing Rate by UFP

You can set the rinsing rate for the UFP to reach the *Rinsing Volume by UFP*. The *Rinsing Time by UFP* is automatically recalculated.

Rinsing Volume by UFP

You can set the rinsing volume (via the dialyser membrane) for the *Rinsing Time by UFP*. The *Rinsing Rate by UFP* is automatically recalculated.

Rinsing Time by BPA/BPV

The rinsing time for *Rinsing Volume by BPA or BPV* is set. BPA/BPV generates the rinsing flow via the dialyser membrane for bag rinsing with connected s-online and rinsing out of the machine.

Rinsing Rate by BPA/BPV

The rinsing rate is set for *Rinsing Volume by BPA or BPV*.

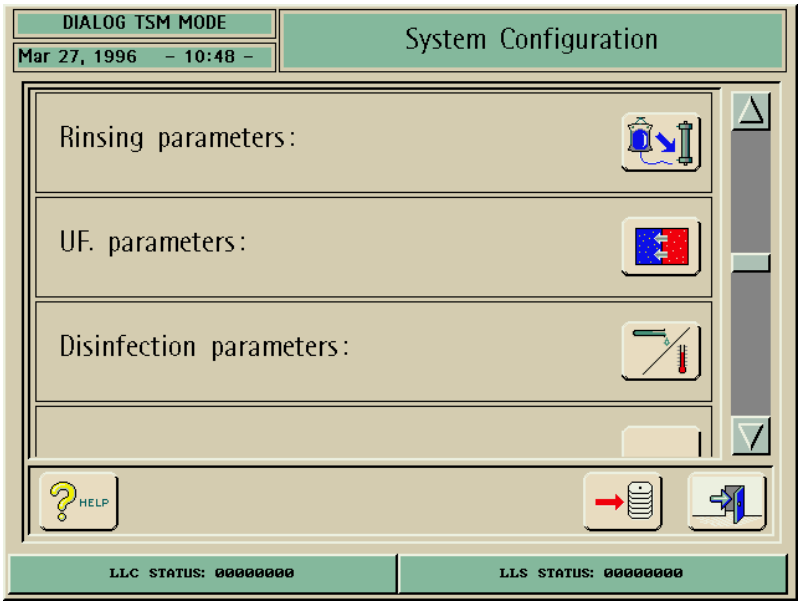
Rinsing Volume by BPA/BPV

The rinsing volume (via the dialyser membrane) is set for *Rinsing Time by BPA or BPV*.

Blood Flow for Connecting Patient

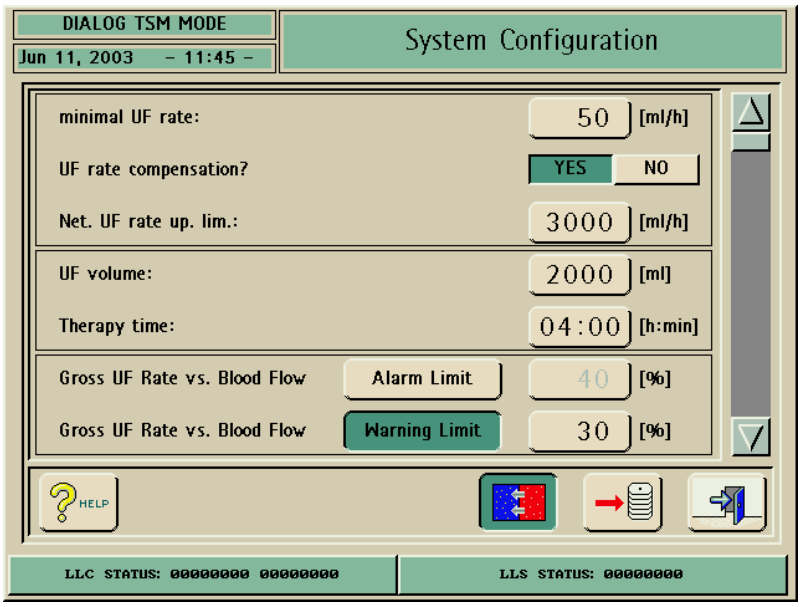
You can set the blood flow for connecting the patient (in therapy). The blood pump BPA is started with this rate when the therapy is started.

4.9.1.8 UF Parameters



The dialysate fluid parameters can be set in the *UF Parameters* menu.

1. Activate the *System Configuration* menu with the *System Configuration* button in menu *Treatment Support*. The following menu is opened and displayed (scroll with scroll bar).


DIALOG TSM MODE
Jun 11, 2003 - 11:45 -
System Configuration
minimal UF rate: 50 [ml/h]
UF rate compensation? YES NO
Net. UF rate up. lim.: 3000 [ml/h]
UF volume: 2000 [ml]
Therapy time: 04:00 [h:min]
Gross UF Rate vs. Blood Flow Alarm Limit 40 [%]
Gross UF Rate vs. Blood Flow Warning Limit 30 [%]
HELP
LLC STATUS: 00000000 00000000
LLS STATUS: 00000000

2. Activate the *UF Parameters* menu with the *UF Parameters* icon. The following menu is opened.

The following parameters can be set:

- Minimal UF rate
- UF rate compensation?
- Net UF rate upper limit
- UF volume
- Therapy time
- Gross UF rate vs. blood flow - alarm limit
- Gross UF rate vs. blood flow - warning limit
- UF profile editor

Minimal UF-Rate
You can set the minimal UF rate.

UF Rate Compensation?
If YES is Activated
If the *Minimal UF Rate* is active the Uf rate is recalculated to reach the required UF volume.

Net UF Rate Upper Limit
You can set the upper limit of the net UF rate.

UF Volume
You can set the UF volume.

Therapy Time
You can set the therapy time.

There is no limit alarms for HDF machines in predilution.

Gross UF Rate vs. Blood Flow - Alarm Limit
You can set and activate an alarm limit, i.e. an alarm (red) is activated if the limit is reached. The alarm limit can only be changed if the warning limit was changed in advance. The alarm can be acknowledged with the key.

Setting Range
The alarm limit can not be set lower than the warning limit (even if the warning limit is deactivated).

Gross UF Rate vs. Blood Flow - Warning Limit

You can set and activate a warning limit, i.e. a warning (yellow) is activated if the limit is reached.

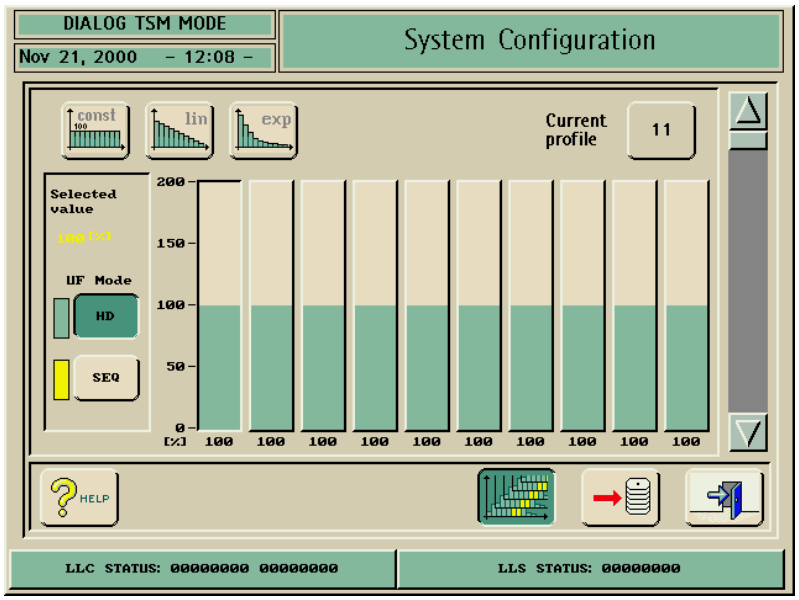
Setting Range
The alarm limit can not be set lower than the warning limit (even if the warning limit is deactivated).

Alarm Limit/Warning Limit

Alarm Limit	Warning Limit	
deactivated	deactivated	No alarm/no warning in therapy
deactivated	activated	Warning in therapy if limit is exceeded
activated	deactivated	Alarm in therapy if limit is exceeded
activated	activated	Alarm and warning in therapy if limit is exceeded

UF Profile Editor

The UF profile can be edited in the *UF Profile Editor*. Editing can be performed in the therapy mode and in the TSM service program.



CONST (Constant)
If this button is activated all intervals of the profile are set to 100%.

LIN (Linear)
If this button is activated only the first interval can be set. A linear adaptation is calculated for the remaining process.

EXP (Exponential)
If this button is activated only the first interval can be set. An exponential adaptation is calculated for the remaining process.

Note

If both the *LIN* and *EXP* buttons are not activated the response of the graph can be selected individually. If an interval is changed the remaining intervals are adapted accordingly. The last interval can not be modified, because this setting is calculated from the previous interval settings.

Current Profile No.
The profile selected with this button is displayed and can be modified. Additionally to 10 standard profiles 20 further profiles can be activated, displayed and modified.

Profile No. 0
This is a constant 100% profile.

Profile No. 1 to 9
These profiles are pre-defined.

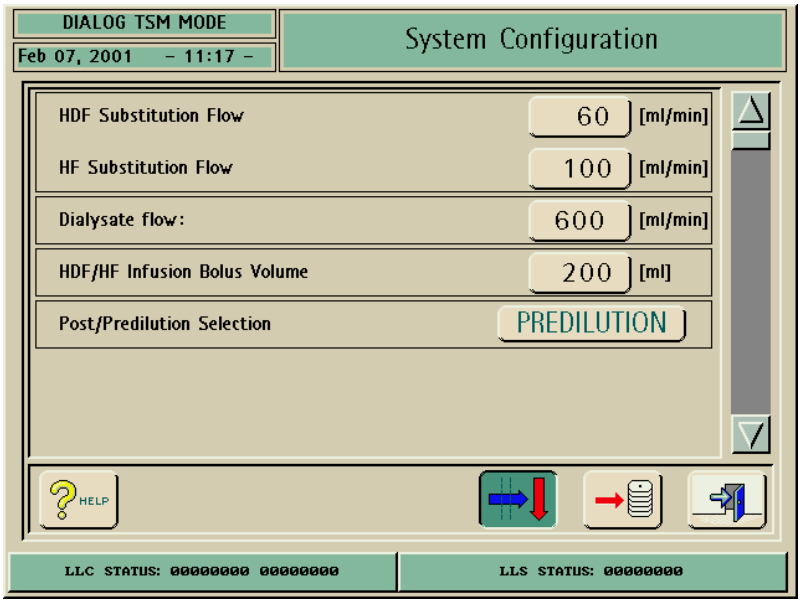
Profile No. 10
A profile which was edited in therapy.

Profile No. 11 to 30
These profiles can be edited in the TSM service program and stored under a number.

UF Mode HD
The UF process of the activated interval is set to HD with the *HD* button.

UF Mode Sequential SEQ
The UF process of the activated interval is set to sequential with the *SEQ* button.

4.9.1.9 HDF/HF Parameters



1. Activate the *System Configuration* menu with the *System Configuration* button in menu *Treatment Support*. Use the scroll bar until the following menu appears.
2. Activate the *Single Needle Parameters* menu with the *Single Needle* icon. The following menu is opened.

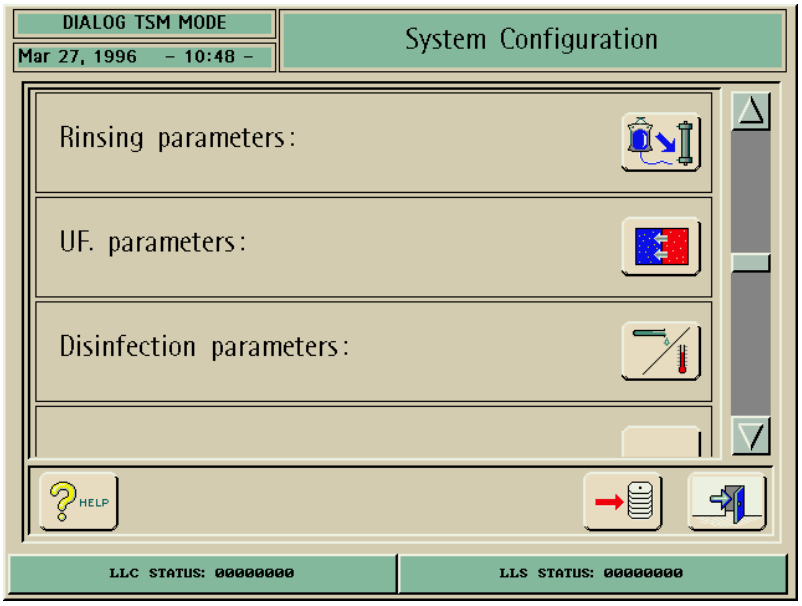
The following parameters can be set.

- HDF/HF substitution flow
- Dialysate flow
- HDF/HF infusion bolus volume
- Post/Predilution Selection

HDF/HF Substitution Flow	The HDF/HF substitution flow can be set.
Dialysate Flow	The dialysate flow can be set.
HDF/HF Infusion Bolus Volume	The HDF/HF infusion bolus volume can be set.
Post/Predilution Selection	You can set predilution for a HDF/HF therapy by activating the *Predilution* button.

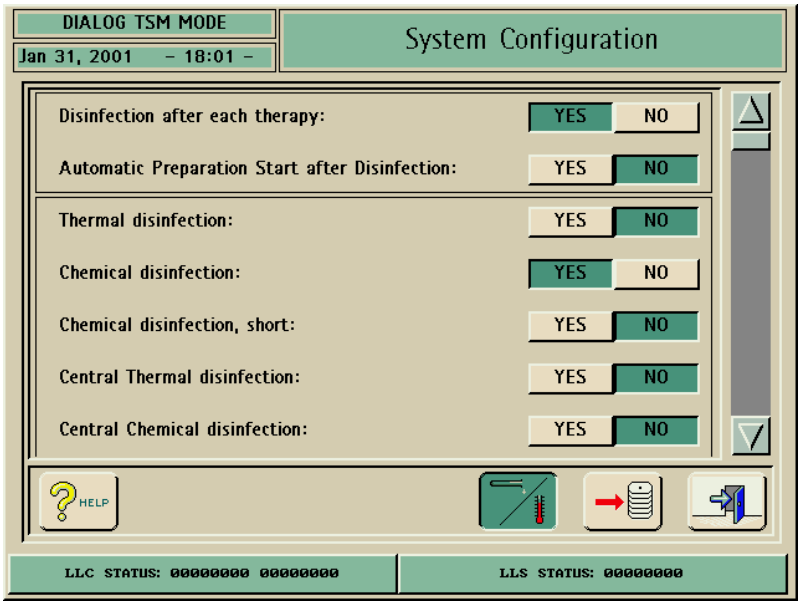
4.9.1.10 Disinfection Parameters

Disinfection after servicing in TSM
Before disinfection: rinse the machine to remove residual dialysate or concentrate in the system.



The disinfection parameters can be set in the *Disinfection Parameters* menu.

1. Activate the *System Configuration* menu with the *System Configuration* button in menu *Treatment Support*. The following menu is opened and displayed (scroll with scroll bar).


DIALOG TSM MODE
Jan 31, 2001 - 18:01 -
System Configuration
Disinfection after each therapy: YES NO
Automatic Preparation Start after Disinfection: YES NO
Thermal disinfection: YES NO
Chemical disinfection: YES NO
Chemical disinfection, short: YES NO
Central Thermal disinfection: YES NO
Central Chemical disinfection: YES NO
HELP
LLC STATUS: 00000000 00000000
LLS STATUS: 00000000

2. Activate the *Disinfection* menu with the *Disinfection Parameters* icon. The following menu is displayed.
3. Scroll the menu with the scroll bar.

The following parameters can be set:

- Disinfection after each therapy
- Automatic Preparation Start after Disinfection
- Thermal Disinfection
- Chemical Disinfection
- Chemical Disinfection, Short
- Central Thermal Disinfection
- Central Chemical Disinfection
- Rinsing
- Auto Switch-On with Rinsing (No Weekly Schedule)
- Switch-On Time
- Auto Switch-On by Weekly Schedule
- Weekly Schedule
- Start on Sunday/Start on Monday
- Maximum Out of Action Time (Day/Hour/ Minutes)
- Disinfection Configuration Data (Central Thermal, Central Chemical, Rinsing)

Disinfection after each Therapy
If the *YES* button is activated a disinfection must be performed after every therapy.

Automatic Preparation Start after Disinfection
YES
After disinfection and rinsing the *Preparation* and the selftests are started.

NO
After disinfection and rinsing the disinfection method is terminated.

Thermal Disinfection

You can enable the thermal disinfection with the *YES* button in the disinfection program or disable with the *NO* button. If you select the *NO* button the thermal disinfection icon is not displayed in the disinfection program.

Chemical Disinfection

You can enable the chemical disinfection with the *YES* button in the disinfection program or disable with the *NO* button. If you select the *NO* button the chemical disinfection icon is not displayed in the disinfection program.

Short Chemical Disinfection

You can enable the short chemical disinfection with the *YES* button in the disinfection program or disable with the *NO* button. If you select the *NO* button the short chemical disinfection icon is not displayed in the disinfection program.

Central Thermal Disinfection

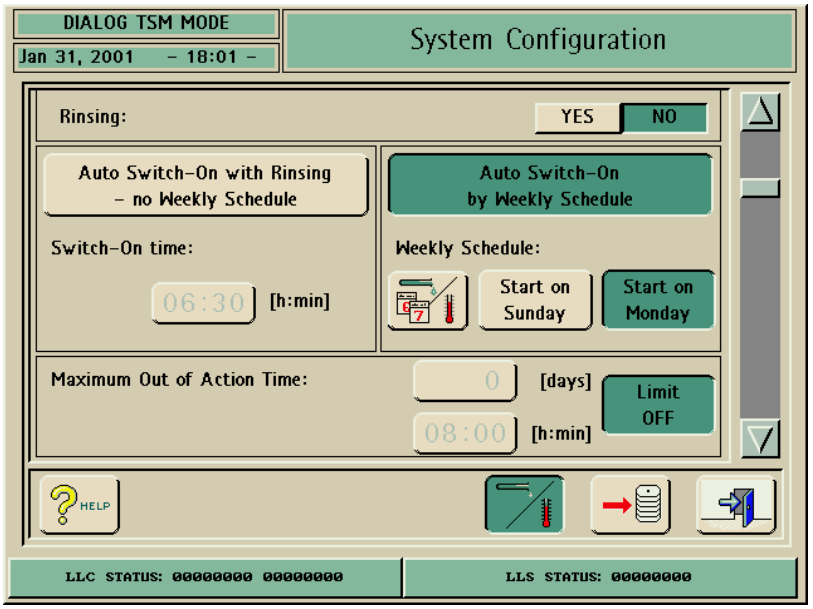
The inlet feed-line and the machine are disinfected with hot water, if the central facility loop-line is also disinfected with hot water (> 85°C).

Central Chemical Disinfection

The inlet feed-lines are disinfected with chemical disinfectants, if the central facility loop-line is also disinfected with chemical disinfectants.

Rinsing

Rinsing of disinfectant residues: e.g. a disinfection was performed in the evening and the residues are rinsed in the morning.



The parameters for the switch-on and the weekly schedule can be set in the menu *Auto Switch-On with Rinsing (No Weekly Schedule)* and *Auto Switch-On (by Weekly Schedule)*. The buttons are interlocked.

Auto Switch-On with Rinsing (No Weekly Schedule)

The machine is rinsed after the preselected switch-on time. The button is only enabled if the function is selected.

Weekly Schedule

The parameters for the weekly schedule can be set with the *Weekly Schedule*.

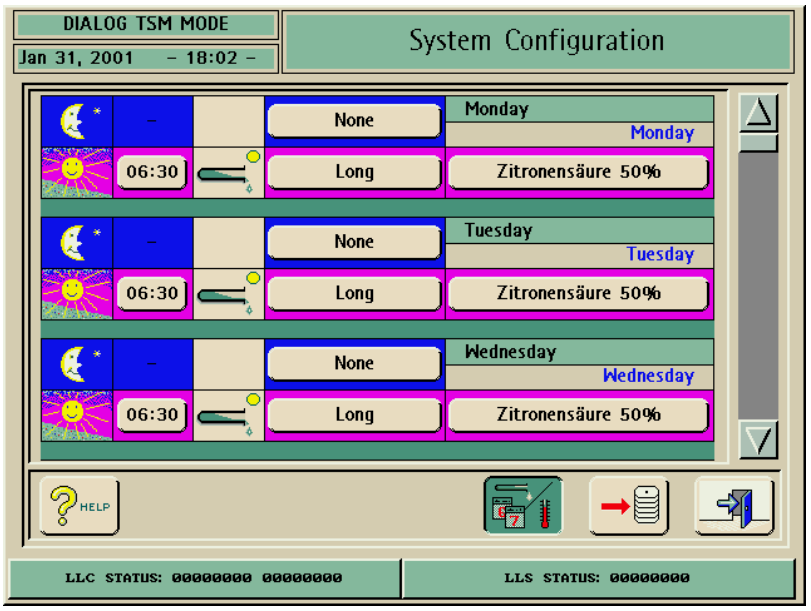
Start on Sunday/Start on Monday

The table for the weekly schedule can either start with Sunday or Monday.

Maximum Out of Action Time

Limit OFF
The function is activated if the *Limit OFF* button is not pressed.

The *Limit OFF* button is activated in the default setting, the parameter buttons are disabled, i.e. parameter values can not be set.



The parameters for the weekly schedule can be set in the *Weekly Schedule* menu.

The table can also be modified by the user in the therapy/disinfection mode.

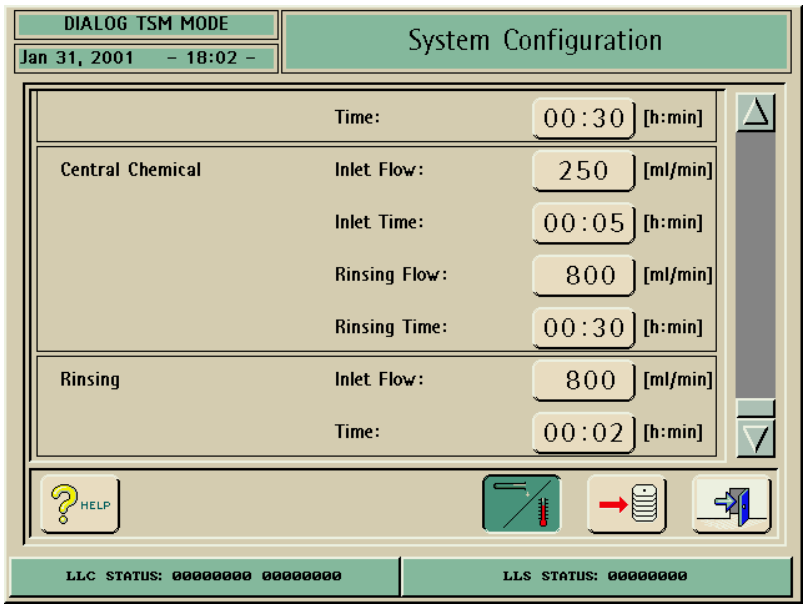
Auto Switch-On by Weekly Schedule

The selected disinfection method is performed according to the preselected *Weekday* and *Time* parameters:

- Monday, Tuesday ..... Sunday
- Night (Moon Symbol), Dialog switches off after disinfection is completed
- Day (Sun Symbol), Dialog does not switch off and remains in *Rinsing*
- Switch-On Time
- Disinfection Method
- Disinfectants

Disinfection Configuration Data (Central Thermal, Central Chemical, Rinsing)

The parameters for the water inlet system can be set in the menu *Disinfection Configuration Data (Central Thermal, Central Chemical, Rinsing)*.

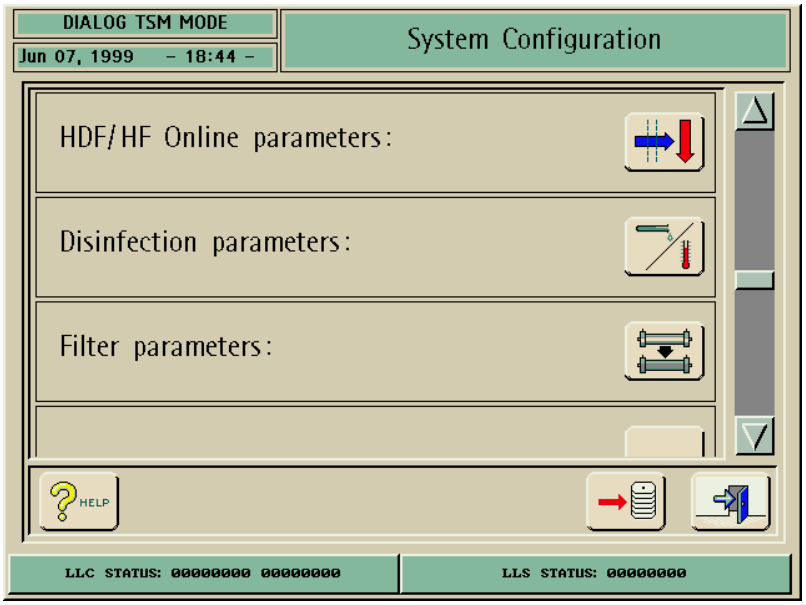


Central Thermal:
- Inlet Flow
- Time

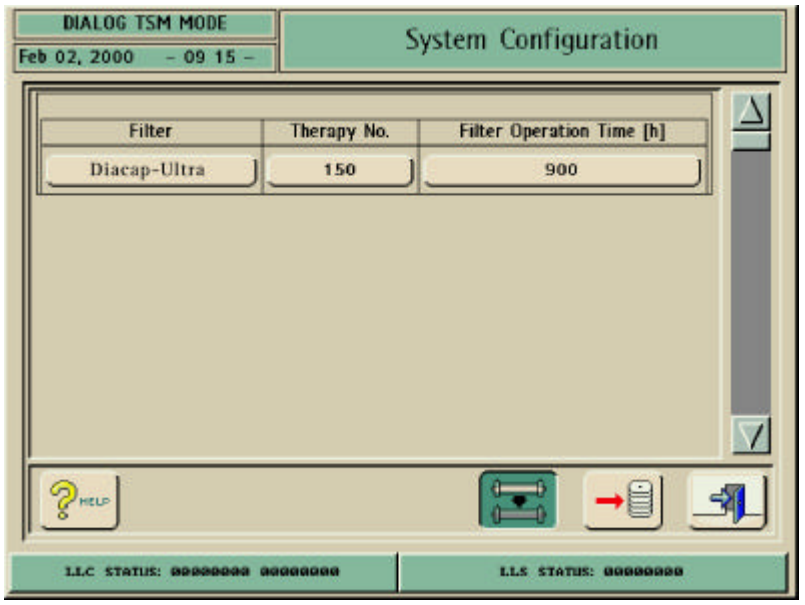
Central Chemical:
- Inlet Flow
- Inlet Time
- Rinsing Flow
- Rinsing Time

Rinsing:
- Inlet Flow
- Time

4.9.1.11 Filter Parameters



1. Activate the *System Configuration* menu with the *System Configuration* button in menu *Treatment Support*. Use the scroll bar until the following menu appears.



2. Activate the *Filter Parameters* menu with the *Filter* icon.

The following parameters can be set for HDF online and pyrogen filter:

- Filter type, e.g. Diacap-Ultra
- Number of therapies (therapy no.)
- Filter operating hour counter (operating time) [h]

Filter

The filter type can be typed, e.g. Diacap-Ultra.

Therapy Number

The number of therapies can be set for the DF/HDF filters.

The following messages are displayed before *Preparation*, after the life-time data for therapy numbers/filter operation time is expired (one of the first three lines are selected/displayed depending on the filter/s which is/are expired):

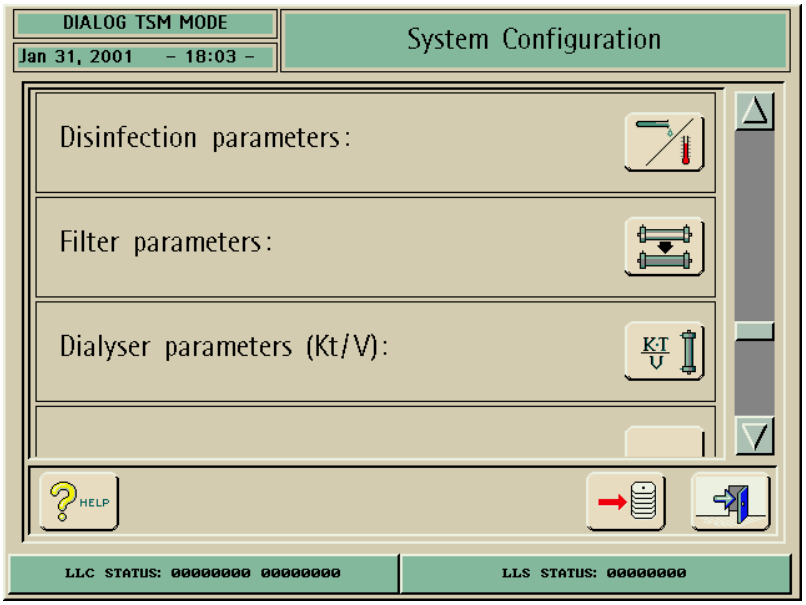
<Check the DF Filter!> or
<Check the HDF Filter!> or
<Check the DF and HDF Filter!> or
<Check the life-time data on the service screen!>
<Do you want to continue with an expired filter?>

The message must be acknowledged with the ↵ key.

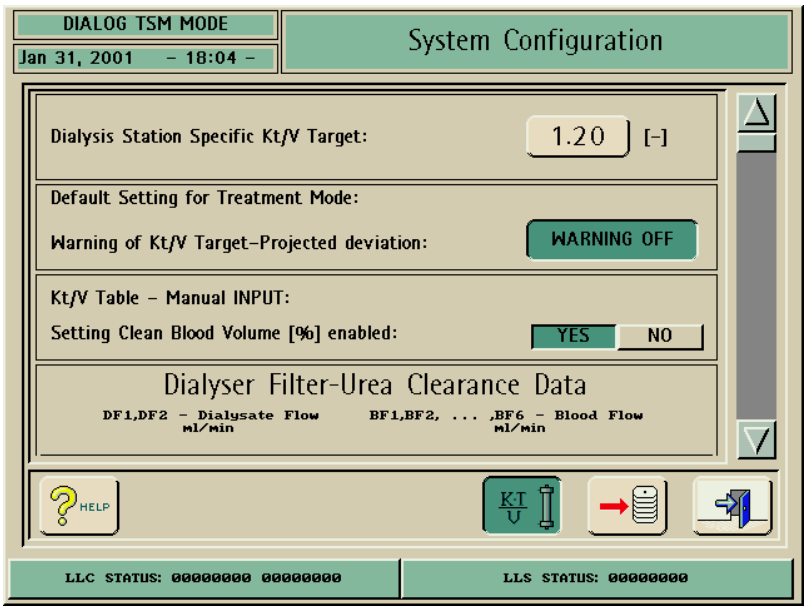
Filter Operation Time [h]

The operating hours can be set for the intended operation time of the DF/HDF filters. The operating hour counter is active when *DF Preparation* is active.

4.9.1.12 Dialyser Parameters (Kt/V)



1. Activate the *System Configuration* menu with the *System Configuration* button in menu *Treatment Support*. Use the scroll bar until the following menu appears.



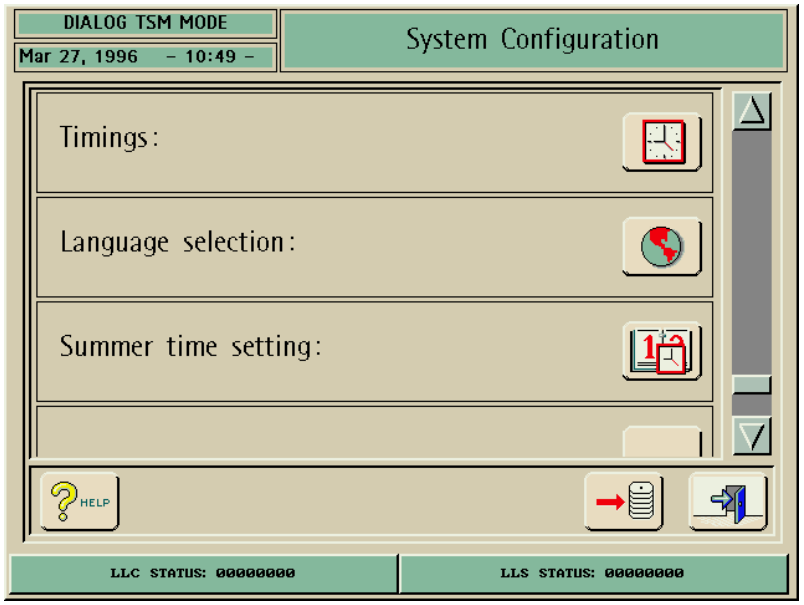
2. Activate the *Dialyser Parameters (Kt/V)* menu with the *Dialyser* icon.

The following parameters can be set.

- Dialysis Station Specific Kt/V Target
- Default Setting for Treatment Mode Warning of Kt/V Target Projected Deviation
- Kt/V Table - Manual INPUT Setting Clean Blood Volume [%] Enabled
- Dialyser Filter Urea Clearance Data

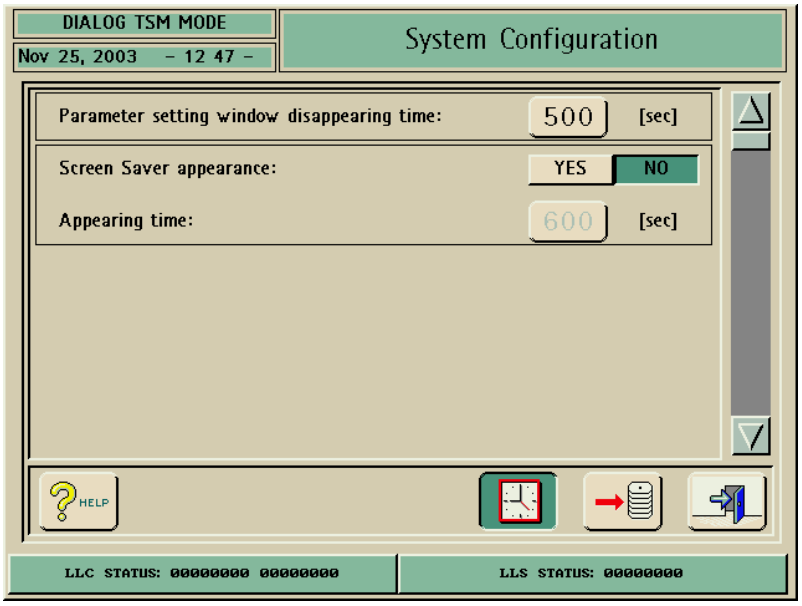
Dialysis Station Specific Kt/V Target	The target value is the Kt/V value at the end of a therapy. The target is set by the user.
Default Setting for Treatment Mode: Warning of Kt/V Target Projected Deviation	If the calculated Kt/V from the set parameters is smaller than the set target value a message is activated.
Kt/V Table - Manual INPUT: Setting Clean Blood Volume [%] Enabled	YES = Activated The ratio can be edited subsequently in therapy for adaptation to the calculated Kt/V value.
Dialyser Filter Urea Clearance Data	The Kt/V is approximately calculated via the *Dialyser Filter Urea Clearance Data* for the selected dialyser (see table, use scroll bar to see table).

4.9.1.13 Timings



The time parameters can be set in the *Timings* menu.

1. Activate the *System Configuration* menu with the *System Configuration* button in menu *Treatment Support*. The following menu is opened and displayed (scroll with scroll bar):



2. Activate the *Timings* menu with the *Timings* icon. The following menu is displayed.

The following parameters can be set:

- Parameter setting window disappearing time
- Screen saver appearance
- Appearing time

Parameter Setting Window Disappearing Time

You can set the automatic disappearing time for the *Parameter Setting Window* (lower screen in therapy).

Screen Saver Appearance

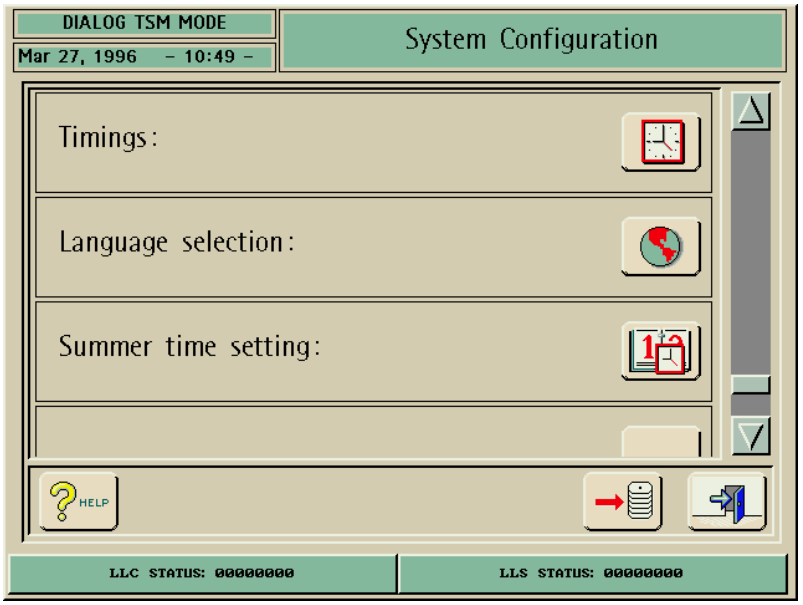
You can activate a screen saver with the *YES* button. The actual image on the screen is then replaced by the screen saver, according to the preset time. The original image appears in case of an alarm or if the screen is touched. The following screen savers are activated:

Therapy selection:	B.Braun logo, date, time
Preparation:	B.Braun logo, time, status line
Therapy and end of therapy:	Time cake, remaining time, status line
Disinfection:	Time cake, disinfection mode, phase

Appearing Time

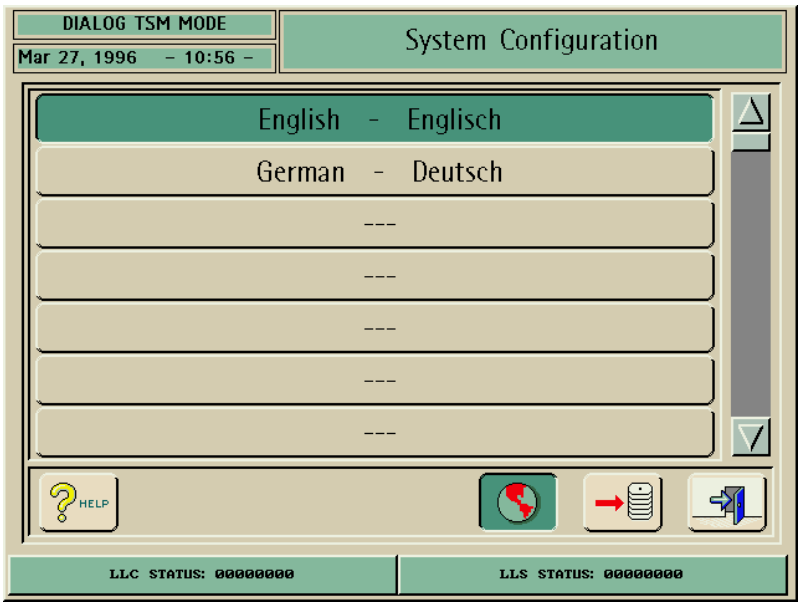
You can set the appearance time of the Screen Saver.

4.9.1.14 Language Selection



A language can be selected in the *Language Selection* menu.

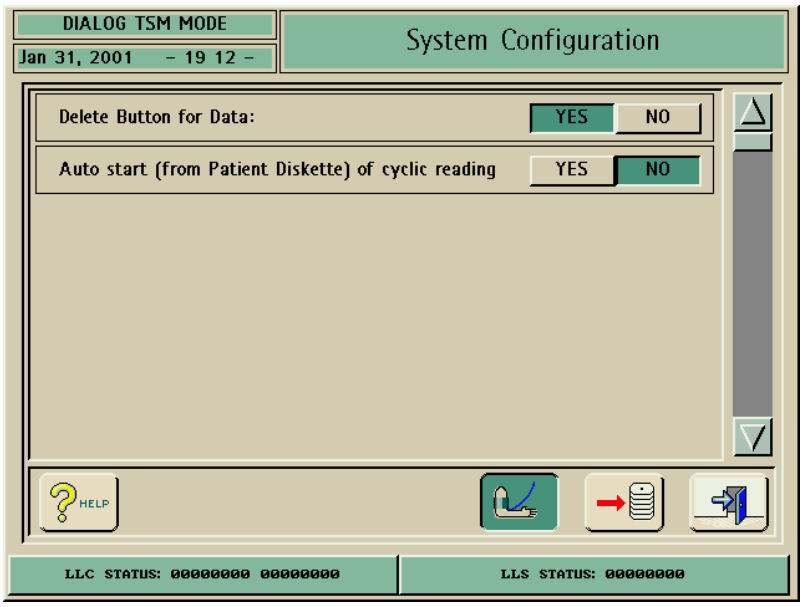
1. Activate the *System Configuration* menu with the *System Configuration* button in menu *Treatment Support*. The following menu is opened and displayed (scroll with scroll bar).



2. Activate the *Language Selection* menu with the *Language Selection* icon. If necessary use the scroll bar to move the menu down. Select the *English* or *German* language or an additional language which is available. The following menu is displayed (or if available additional language).

If English is selected the therapy and TSM language is English. If German is selected the therapy and TSM language is German. If an additional language is selected this language is used in therapy. The TSM language is English.

4.9.1.15 Automatic Blood Pressure Measurement ABPM



The ABPM parameters can be set in the *ABPM* menu.

1. Activate the *System Configuration* menu with the *System Configuration* button in menu *Treatment Support*. The following menu is opened and displayed.

The following parameters can be set:

- Delete Button Data
- Auto Start (from Patient Diskette) of Cyclic Reading

Delete Button Data

YES = Activated
In therapy a delete button is displayed in the ABPM menu. The measurement data can be deleted in the table.

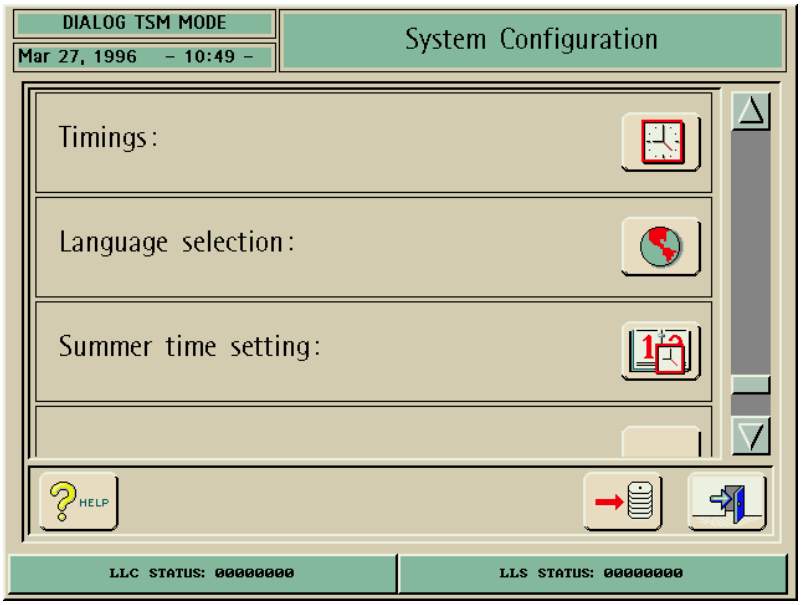
NO = Deactivated
The measurement data is saved in the table until the end of therapy and can not be deleted.

Auto Start (from Patient Diskette) of Cyclic Reading

NO
The cyclic blood pressure measurement must always be selected manually.

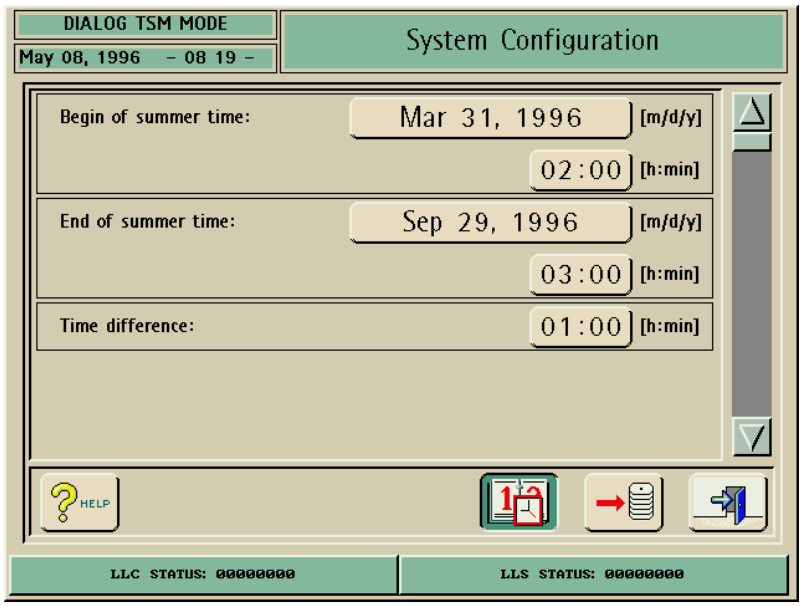
YES
If the cyclic blood pressure measurement is on the patient diskette ABPM is automatically activated at the beginning of a new therapy.

4.9.1.16 Summer Time Setting



The *Summer Time Parameters* can be set in the *Summer Time Setting* menu.

1. Activate the *System Configuration* menu with the *System Configuration* button in menu *Treatment Support*. The following menu is opened and displayed (scroll with scroll bar).



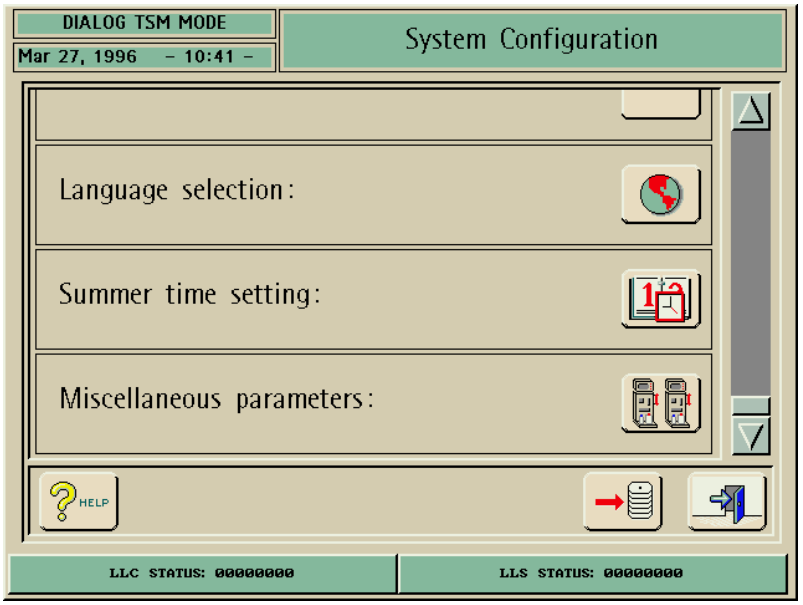
2. Activate the *Summer Time Setting* menu with the *Summer Time Setting* icon. The following menu is displayed.

The following parameters can be set:

- Begin of summer time
- End of summer time
- Time difference

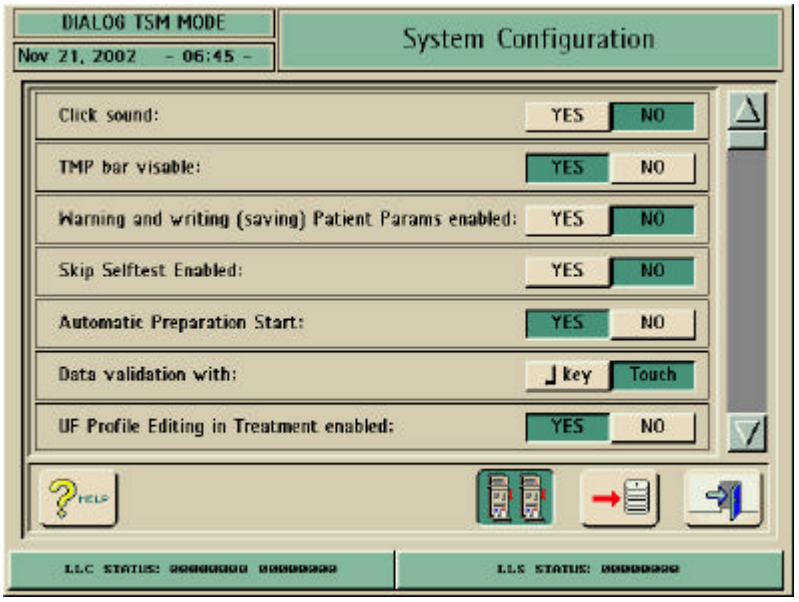
Begin of Summer Time	If necessary you can set the start of the summer time (date and hour).
End of Summer Time	If necessary you can set the end of the summer time (date and hour).
Time Difference	If necessary you can set the time difference between summer and winter time.

4.9.1.17 Miscellaneous Parameters



Further parameters can be set in the *Miscellaneous Parameters* menu.

1. Activate the *System Configuration* menu with the *System Configuration* button in menu *Treatment Support*. The following menu is opened and displayed (scroll with scroll bar).


DIALOG TSM MODE
Nov 21, 2002 - 06:45 -
System Configuration
Click sound: YES NO
TMP bar visable: YES NO
Warning and writing (saving) Patient Params enabled: YES NO
Skip Selftest Enabled: YES NO
Automatic Preparation Start: YES NO
Data validation with: key Touch
UF Profile Editing in Treatment enabled: YES NO
HELP

2. Activate the *Miscellaneous Parameters* menu with the *Miscellaneous Parameters* icon. The following menu is displayed.

The following parameters can be set:

- Click Sound
- TMP Bar Visable
- Warning for Patient Data Saving
- Skip Selftests Enabled
- Automatic Preparation Start
- Data Validation with
- UF Profile No. 10 Setting
- Manual Bypass Confirmation Window Enabled
- End of Therapy Sound Duration
- Automatic Reinfusion Start at Entering End of Treatment
- DCI (Dianet Address/Data Set)
- DBI (Baud Rate/Data Set)

Click Sound

If you acitvate the *YES* button a click sound is activated if a button or the touch screen is pressed.

TMP Bar Visible

If you click the *YES* button you can activate a TMP display in the therapy mode. The TMP display is only visible in therapy.

Warning for Patient Data Saving

If you click the *YES* button you can generate a warning message to save the patient data in the following cases:

- The patient data was loaded from the floppy disk drive
- The therapy was terminated without saving the patient data

Skip Selftests Enabled

It is <u>not permitted</u> to activate the *Skip Selftest Enable* function!
It is <u>prohibited</u> to run a therapy with a patient if the selftest was not passed successfully!

Automatic Preparation Start

Preparation is started after the machine is switched on, if the machine was in therapy selection mode when switched off.

Data Validation with

Data acknowledgement can either be performed with the touch screen or the keyboard.

UF Profile No. 10 Setting

The editing of the UF profiles can be performed in treatment.

Manual Bypass Confirmation Window Enabled	The confirmation window for bypass can be enabled with YES. Thus every bypass switching must be confirmed manually.
End of Therapy Sound Duration	The duration of the sound can be reduced at the end of a therapy.
Automatic Reinfusion Start at Entering End of Treatment	A window is automatically opened at the end of therapy. This window must be confirmed at the end of the therapy for the reinfusion of the blood.
DCI (Dianet Address/Data Set)	For detailed information regarding networking for Dialog machines see the technical information 4/00 - Dialog Communication Interface DCI!
DBI (Baud Rate/Data Set)	For detailed information regarding networking for Dialog machines see the technical information: Nexadia BSL Network and the respective software for networking!

4.9.1.18 DBI Parameters

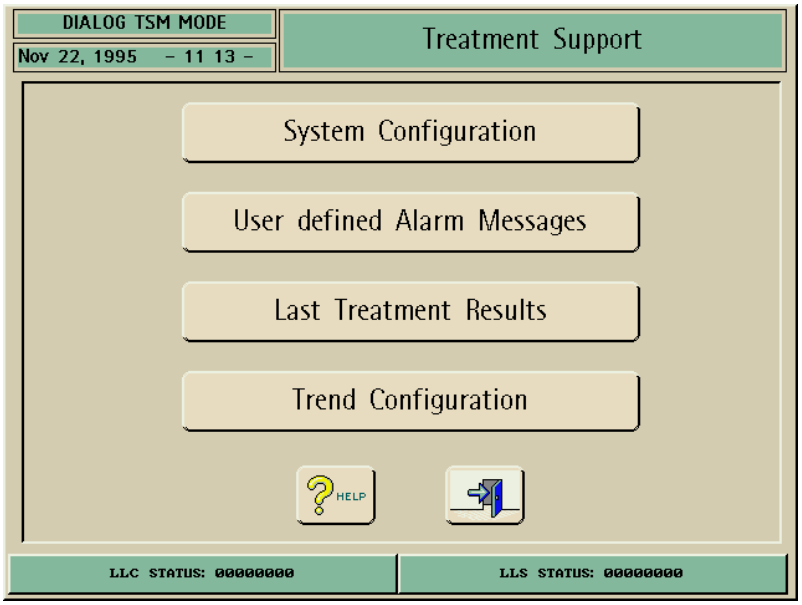
For detailed information regarding networking for Dialog machines see the technical information: Nexadia BSL Network and the respective software for networking!

4.9.2 User Defined Alarm Messages

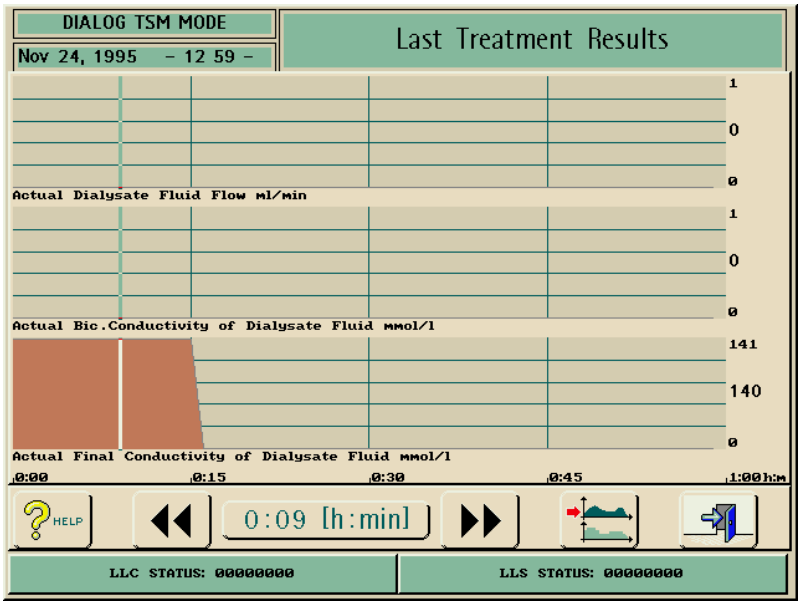
The function *User Defined Alarm Messages* is not available for software ≤ 6.XX.

4.9.3 Last Treatment Results

The last treatment results can be displayed. The time base can be selected. Five different graphic blocks can be selected. Three treatment parameters for every block can be configured individually.



1. Activate the *Treatment Support* menu with the *Treatment Support* key in the *TSM Main Menu*. The following menu is opened.

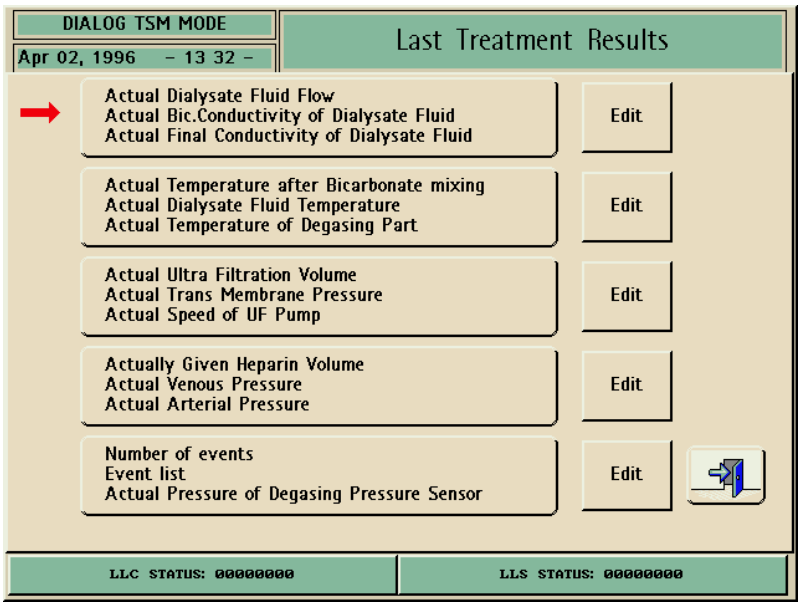


2. Activate the *Last Treatment Results* menu with the *Last Treatment Results* key in the *Treatment Support* menu. The following menu is opened and displayed.

The following settings can be selected:

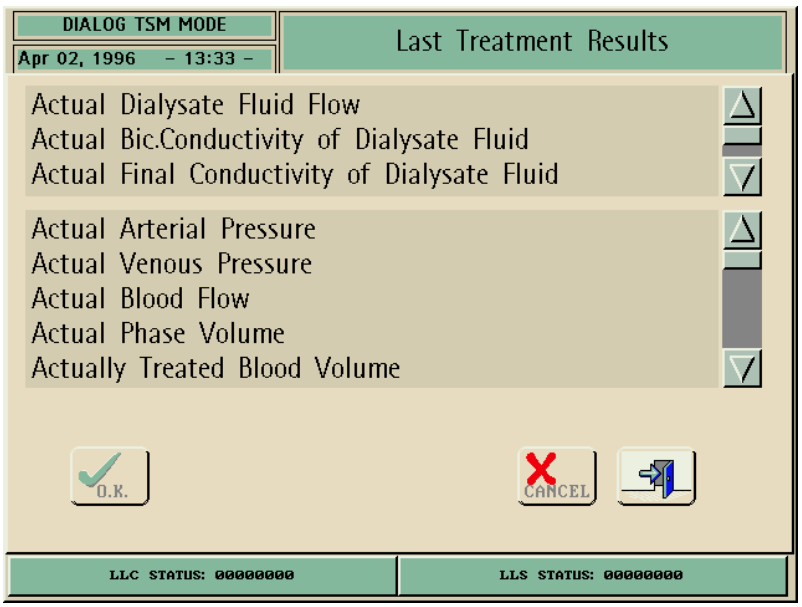
- Cursor (left and right)
- Time display
- Selection of trend groups

Cursor (left and right)	You can shift the time base in one minute increments with the left or right cursor. The time is displayed in the *Time Display* window. A specific time can be selected in the graphics with the time base. Thus the corresponding events can be displayed.
Time Display	You can position the time base on a certain treatment time. The corresponding events can be displayed.
Selection of Trend Groups	You can select the *Trend Groups* menu. Five trend groups with three treatment parameters each, can be configured individually.



The trend group to be displayed can be selected (red arrow). You can select three treatment parameters from a list for one group with the *Edit* key.

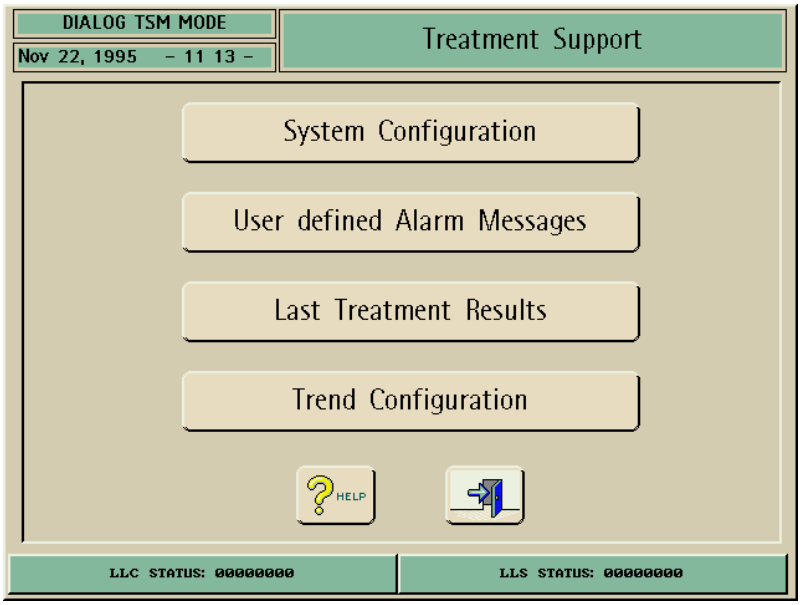
1. Press the *Edit* key to select treatment parameters.



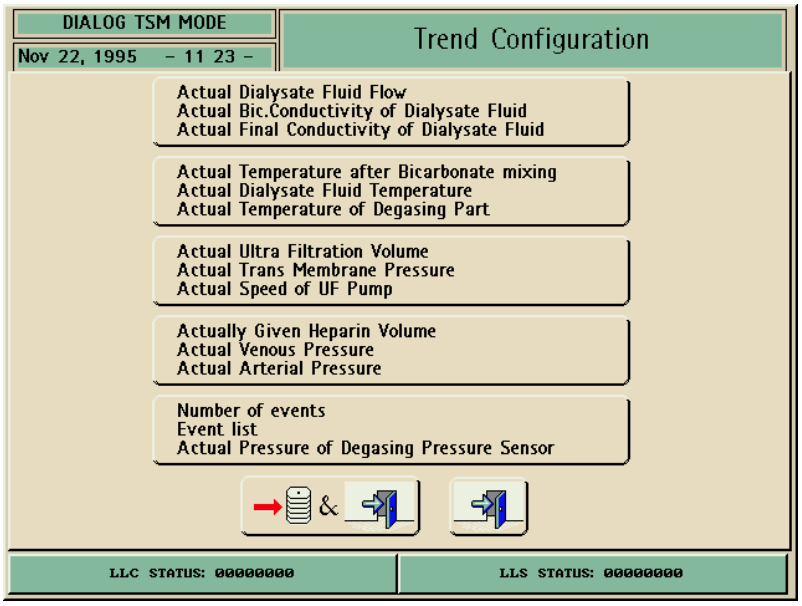
2. Select the parameter from the top field (if necessary use scroll bar) that you would like to exchange.
3. Select the new parameter from the bottom field (if necessary use scroll bar) that you would like to take over.
4. Press the *OK* key. The new parameter is taken over.

4.9.4 Trend Configuration

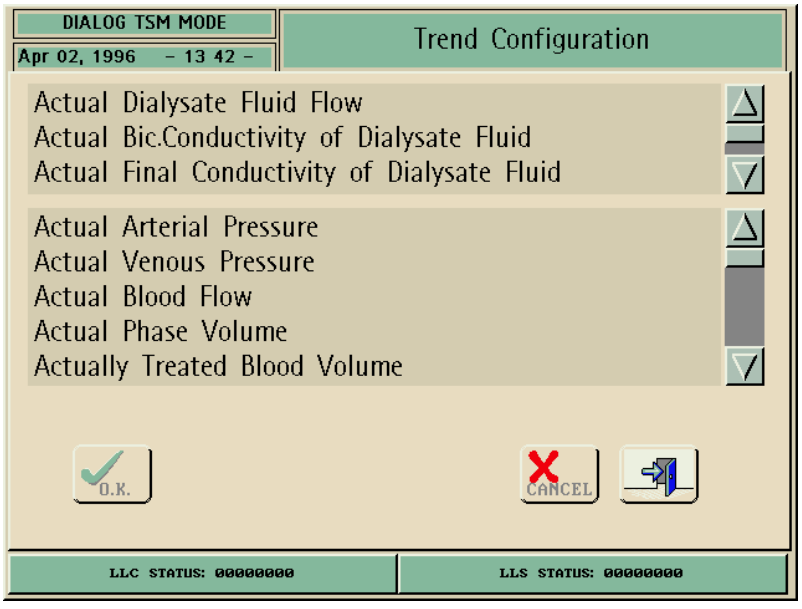
You can select five different trend groups for the treatment mode. Three treatment parameters can be configured individually for every group.



1. Activate the *Treatment Support* menu with the *Treatment Support* key in the *TSM Main Menu*. The following menu is opened.

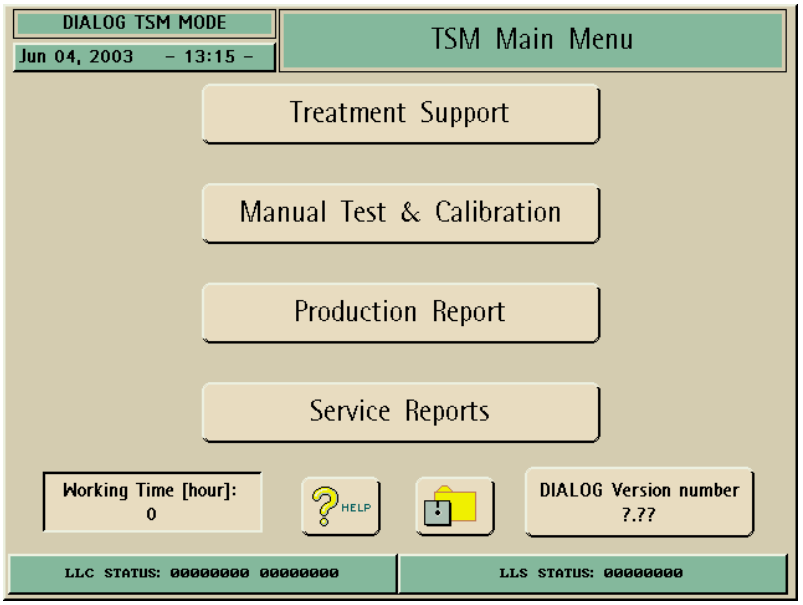

DIALOG TSM MODE
Nov 22, 1995 - 11 23 -
Trend Configuration
Actual Dialysate Fluid Flow
Actual Bic.Conductivity of Dialysate Fluid
Actual Final Conductivity of Dialysate Fluid
Actual Temperature after Bicarbonate mixing
Actual Dialysate Fluid Temperature
Actual Temperature of Degasing Part
Actual Ultra Filtration Volume
Actual Trans Membrane Pressure
Actual Speed of UF Pump
Actually Given Heparin Volume
Actual Venous Pressure
Actual Arterial Pressure
Number of events
Event list
Actual Pressure of Degasing Pressure Sensor
LLC STATUS: 00000000
LLS STATUS: 00000000

2. Activate the *Last Trend Configuration* menu with the *Trend Configuration* key in the *Treatment Support* menu. The following menu is opened and displayed.



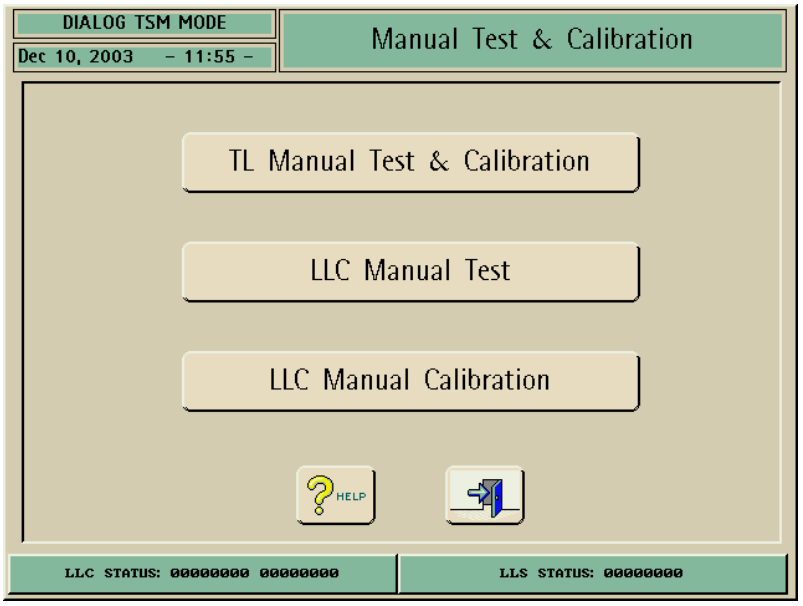
3. Select a trend group. The following menu is opened and displayed.
4. Select the parameter (if necessary use scroll bar) that you would like to exchange.
5. Select the new parameter (if necessary use scroll bar) that you would like to take over.
6. Press the *OK* key. The new parameter is taken over.

4.10 Manual Test and Calibration



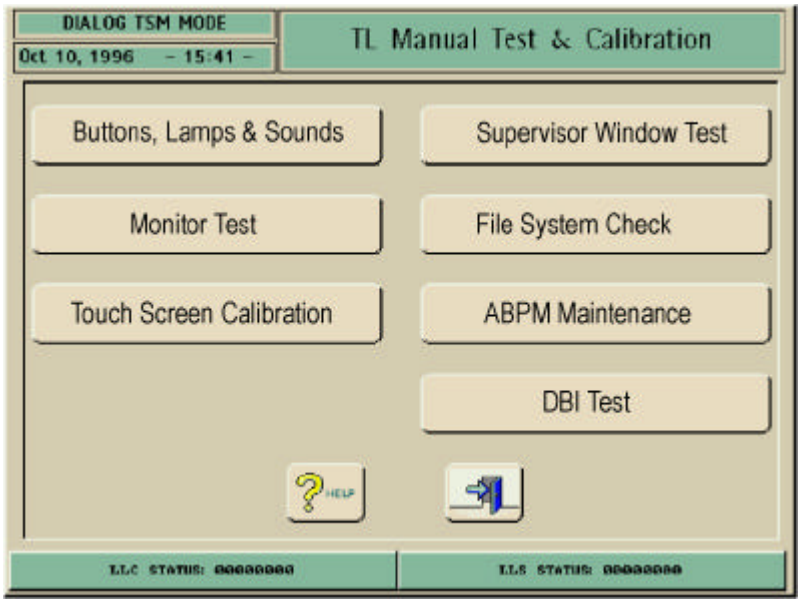
The menu contains test and calibration functions. The user can test all basic operations and calibrate components (e.g. sensors and pumps).

The *TSM Main Menu* appears after the machine is switched on.



1. Activate the *Manual Test and Calibration* menu with the *Manual Test and Calibration* key in the *TSM Main Menu*. The following menu is opened.

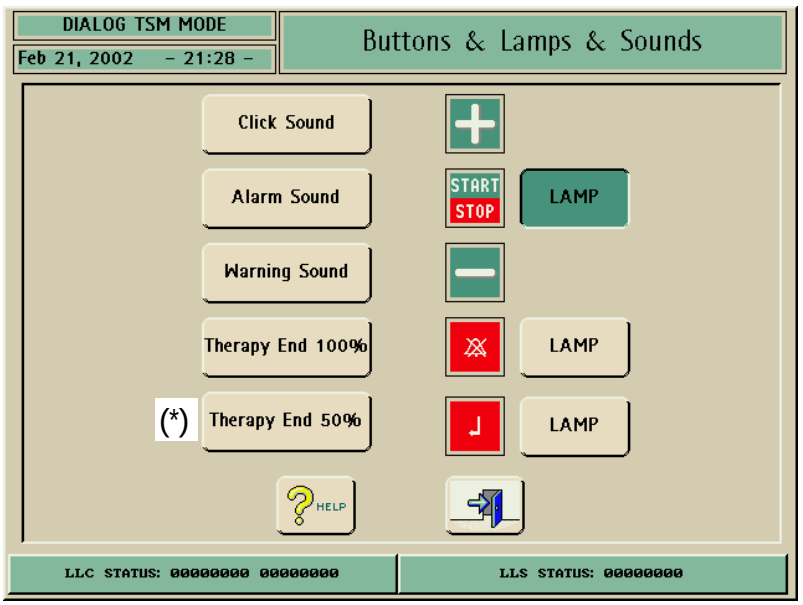
4.10.1 TL Manual Test and Calibration



In the *TL Manual Test and Calibration* menu you can perform the functional tests and a touch screen calibration method for the top level system and options also connected to top level system.

1. Activate the *TL Manual Test and Calibration* menu with the *TL Manual Test and Calibration* key.

4.10.1.1 Buttons, Lamps and Sounds

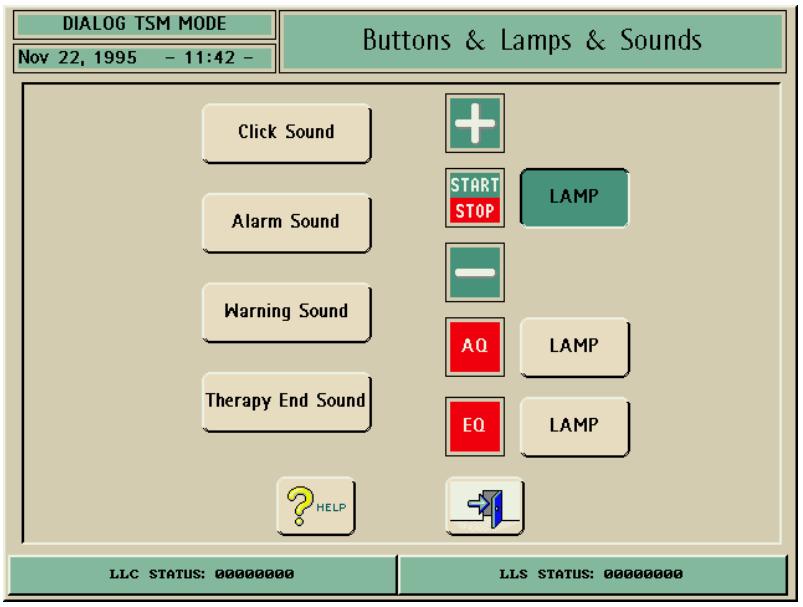


Software ³ 3.46 / (*) ≥ 5.XX

1. Activate the *Buttons, Lamps and Sounds* menu with the *Buttons, Lamps and Sounds* key in the *TL Manual Test and Calibration* menu. The following menu is displayed.

The following parameters can be checked:

- Click Sound
- Alarm Sound
- Warning Sound
- Therapy End 100%
- Therapy End 50% (* SW ≥ 5.XX)
- START STOP LED
- LED
- LED



Software < 3.46

1. Activate the *Buttons, Lamps and Sound* menu with the *Buttons, Lamps and Sound* key in the *TL Manual Test and Calibration* menu. The following menu is displayed.

The following parameters can be checked:

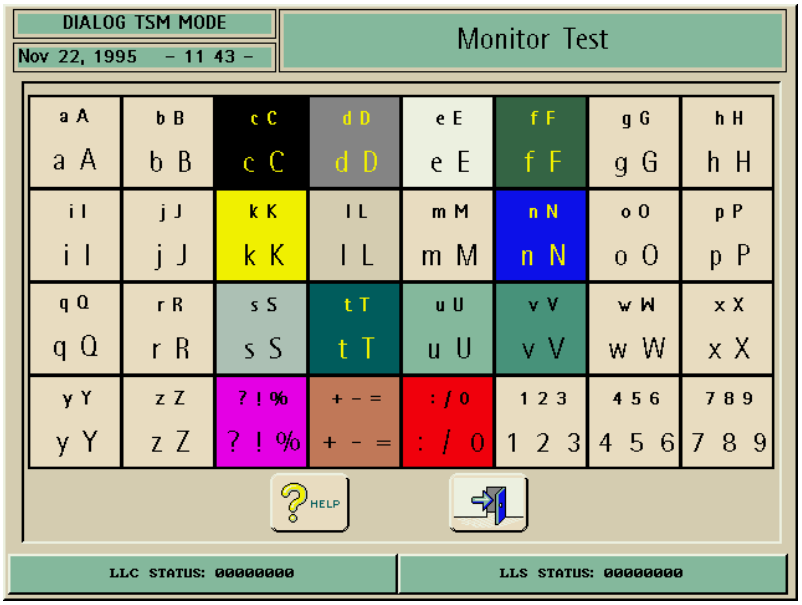
- Click Sound
- Alarm Sound
- Warning Sound
- Therapy End Sound
- START STOP LED
- AQ LED
- EQ LED

You can test the keys and lamps of the menbrane keyboard and the sounds. You can test the function of the +-, START STOP-, −-, -, and ↵ keys and the respective LEDs. You can also test the different sounds: click sound, alarm and warning sounds.

Inscription on Keys	SW < 3.46	SW ≥ 3.46
Acknowledge alarms:	AQ	
Acknowledge entries:	EQ	↵

4.10.1.2 Monitor Test

A table appears with all colours. Every square contains an alphanumerical character with different character fonts. The brightness and the contrast of the monitor can be checked with this test image.

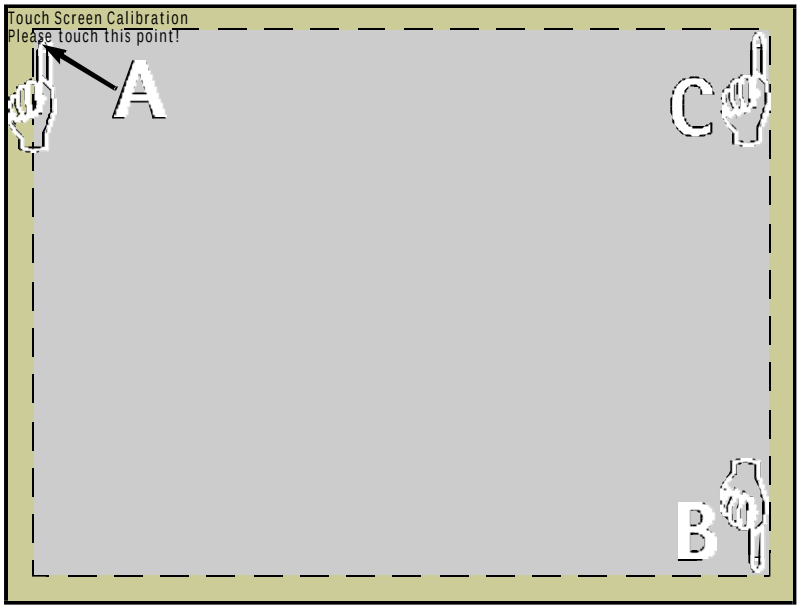

DIALOG TSM MODE
Nov 22, 1995 - 11 43 -
Monitor Test
a A b B c C d D e E f F g G h H
i I j J k K l L m M n N o O p P
q Q r R s S t T u U v V w W x X
y Y z Z ? ! % + - = : / 0 1 2 3 4 5 6 7 8 9
HELP
LLC STATUS: 00000000
LLS STATUS: 00000000

1. Activate the *Monitor Test* menu with the *Monitor Test* key in the *TL Manual Test and Calibration* menu. The following menu is displayed.

4.10.1.3 Touch Screen Calibration

The touch screen can be calibrated.

The active part of the touch screen is displayed in the figure. Three corner points are used (**A**, **B** and **C**) for the calibration. The touch area is defined by the calibration. To ensure an accurate calibration tip on the finger tip of the symbol during calibration.



1. Activate the *Touch Screen Calibration* menu with the *Touch Screen Calibration* key in the *TL Manual Test and Calibration* menu. The following menu is displayed.
2. Tip the finger symbol **A** in the upper left corner. The first calibration point is defined.
3. Tip the finger symbol **B** in the lower right corner. The second calibration point is defined.
4. Tip the finger symbol **C** in the upper right corner. The third calibration point is defined. The calibration data is stored. The intial menu is automatically displayed again.
5. Switch the Dialog off and on again. The new calibration data are loaded for the touch screen.
6. Check the touch screen.

Reset Default Values

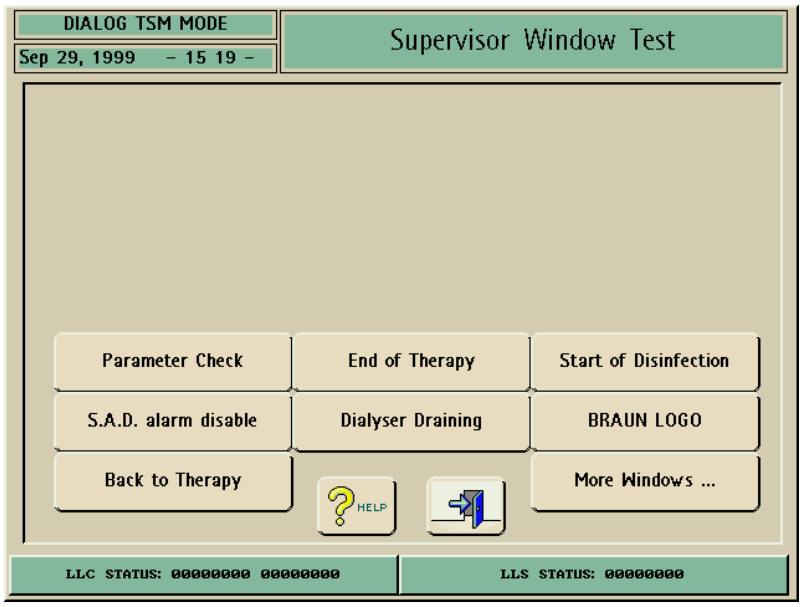
If the touch screen is out of function (e.g. after a faulty calibration) the default values for the touch screen can be downloaded.

Take the following steps to reset the default values for the touch screen:

1. Press the ± key of the blood pump keyboard three times in the *TSM Main Menu*.
2. Switch machine off and on again. The old default data is restored.

4.7.1.4 Supervisor Window Test

The position and data of the selected supervisor window is displayed. You can close the window with the *Cancel* key.



1. Activate the *Supervisor Window Test* menu with the *Supervisor Window Test* key in the *TL Manual Test and Calibration* menu. The following menu is displayed.

The following supervisor windows can be checked:

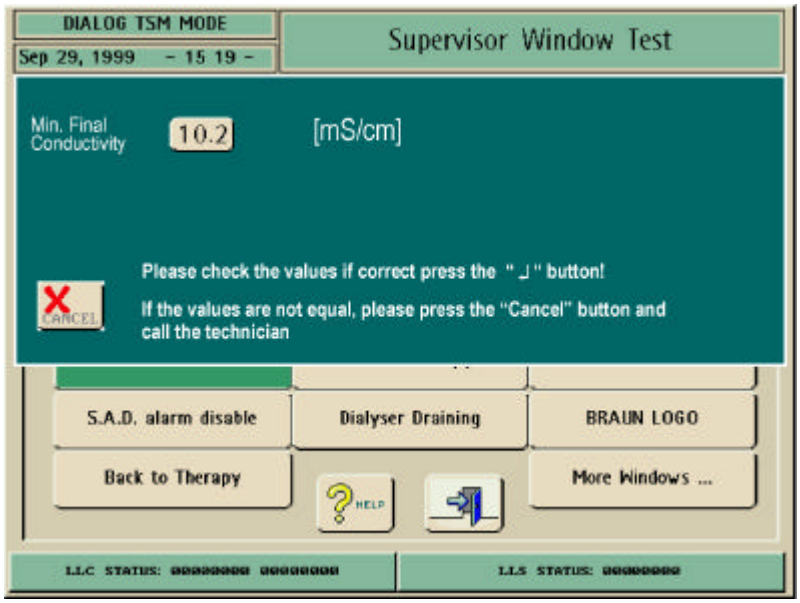
- Parameter Check
- SAD Alarm Disable
- Back to Therapy
- End of Therapy
- Dialyser Draining
- Start of Disinfection
- Braun Logo

More Windows ...:

- Multi Window
- UF Time and Max. UF Rate
- Connecting Patient
- MW with Substitution Volume
- Min. and Max. Final Conductivity
- UF Volume and Max. UF Rate
- Skip Selftests
- Reinfusion

The parameter check is displayed as an example

The position of the supervisor window and the data of the *Minimal Final Conductivity* is displayed. You can either close the supervisor window with the *Cancel* key or select and acknowledge the single parameters and close the supervisor window with the ↵ key.



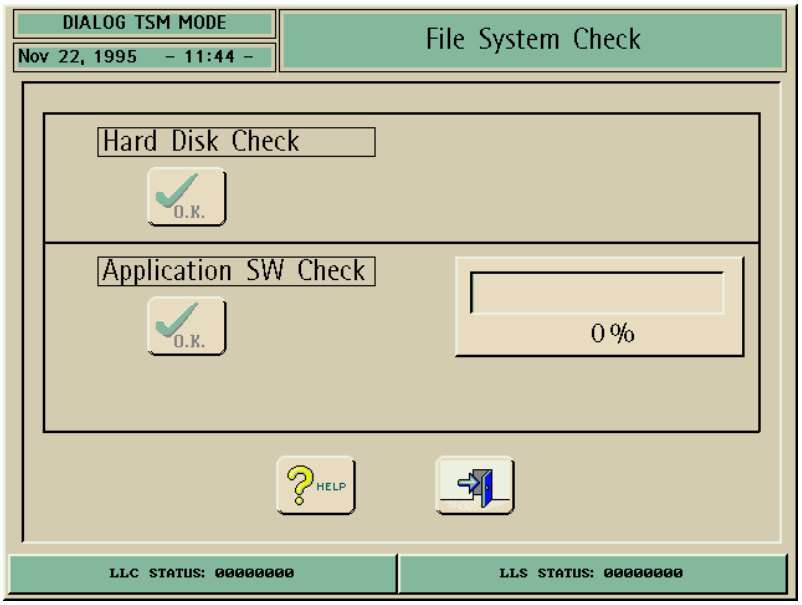
2. Activate the *Parameter Check* window with the *Parameter Check* key. The following menu is displayed.
3. Press the *Cancel* key to close the supervisor window.

or

Press the ↵ key to select and acknowledge the single parameters and close the supervisor window.

4.7.1.5 File System Check

Press the *OK* key to start the check of the Dialog file system. This function reads all executable files and creates a check value. If it does not equal with the original check value a warning message is displayed.

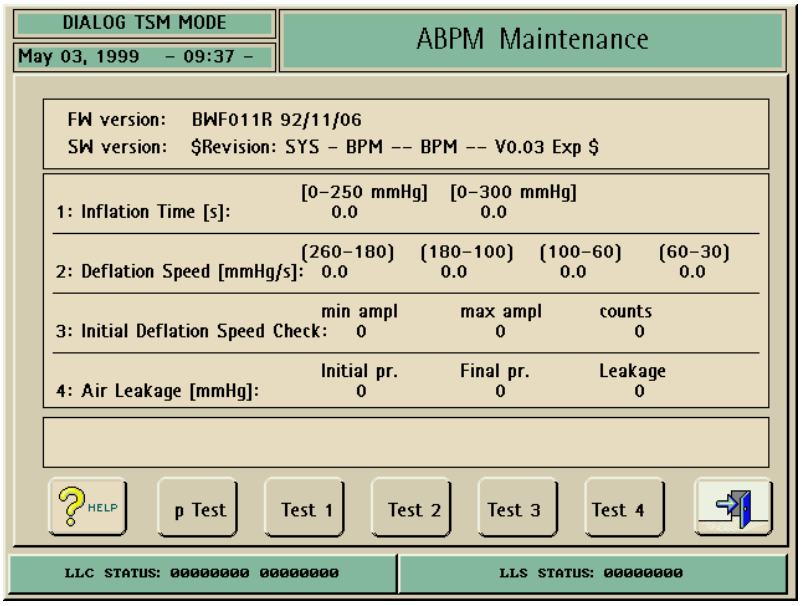


1. Activate the *Test System Check* menu with the *Test System Check* key in the *TL Manual Test and Calibration* menu. The following menu is displayed.
2. Press the *OK* key of the *Hard Disk Check* to test the hard disk drive.

   or

   Press the *OK* key of the *Application SW Check* to test the application software.

4.10.1.6 ABPM Maintenance


DIALOG TSM MODE
May 03, 1999 - 09:37 -
ABPM Maintenance
FW version: BWF011R 92/11/06
SW version: $Revision: SYS - BPM -- BPM -- V0.03 Exp $
[0-250 mmHg] [0-300 mmHg]
1: Inflation Time [s]: 0.0 0.0
(260-180) (180-100) (100-60) (60-30)
2: Deflation Speed [mmHg/s]: 0.0 0.0 0.0 0.0
min ampl max ampl counts
3: Initial Deflation Speed Check: 0 0 0
Initial pr. Final pr. Leakage
4: Air Leakage [mmHg]: 0 0 0
HELP
p Test
Test 1
Test 2
Test 3
Test 4
LLC STATUS: 00000000 00000000
LLS STATUS: 00000000

1. Activate the *ABPM Maintenance* menu with the *ABPM Maintenance* key in the *TL Manual Test and Calibration* menu. The following menu is displayed.

The *ABPM Maintenance* menu is used for the function test of the Dialog automatic blood pressure measurement ABPM option. The cuff is replaced by a 500 ml measurement chamber.

The following functions can be tested:

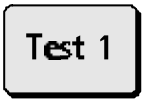
- P Test (Pressure Comparison Test)
- Test 1 (Inflation Time)
- Test 2 (Deflation Speed)
- Test 3 (Initial Deflation Speed Check)
- Test 4 (Air Leakage)

See chapter 5 technical safety inspection and preventive maintenance: inspection protocol for the automatic blood pressure measurement ABPM and the execution procedure for the measurement inspection.

Pressure Comparison Test

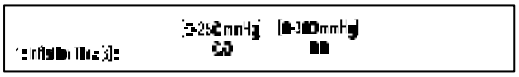
The *P Test* key activates and deactivates the pressure comparison test of the ABPM. The *P Test* is used to compare the pressure value of the pressure sensor with a reference instrument.
A reference instrument (accuracy ≤ ± 0.5 mmHg) is required for the comparison test of the pressure sensor.

Inflation Time [s]



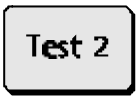
The *Test 1* key activates and deactivates the inflation time. Thus the inflation time of the pump is tested up to 300 mmHg, i.e.:

- 0 - 250 mmHg
- 0 - 300 mmHg



The measurement chamber is connected to the ABPM system via the pressure tubing. A pressure is built up to 300 mmHg.

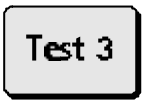
Deflation Speed [mmHg/s]



The *Test 2* key activates and deactivates the deflation speed. Thus the deflation speed of the deflation valve is tested. The deflation starts at 300 mmHg.

The measurement chamber is connected to the ABPM system via the pressure tubing. A pressure is built up to 300 mmHg. The deflation speed is devided in 4 steps: : 260 - 180 mmHg, 180- 100 mmHg, 100 - 60 mmHg and 60 - 30 mmHg.

Initial Deflation Speed Check

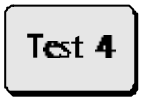


The *Test 3* key activates and deactivates the initial deflation speed check. Thus the initial deflation speed of the ABPM is tested.

The measurement chamber is connected to the ABPM system via the pressure tubing. A pressure is built up to 300 mmHg. The initial deflation speed is checked:

- Min. amplitude
- Max. amplitude
- Counts

Air Leakage [mmHg]



The *Test 4* key activates and deactivates the air leakage test (3 minutes). Thus the pneumatic integrity of the ABPM system is tested.

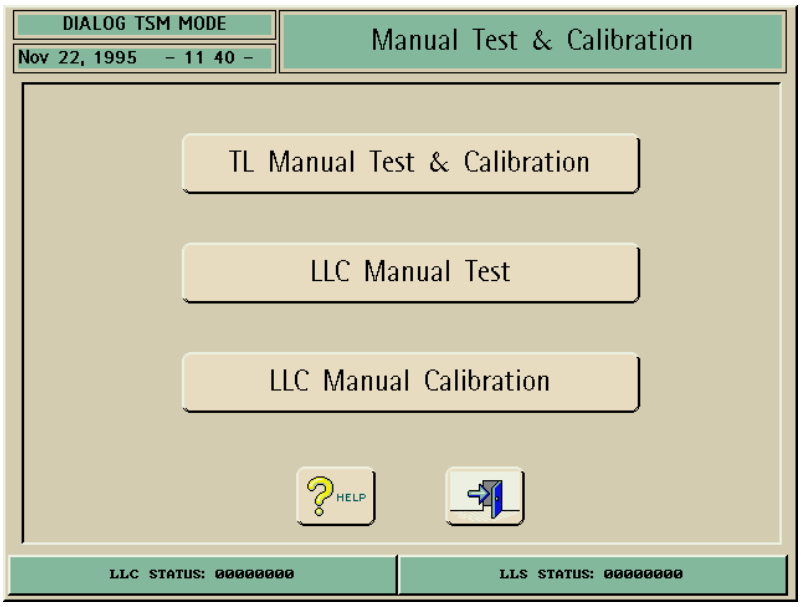
The measurement chamber is connected to the ABPM system via the pressure tubing. A pressure is built up to 300 mmHg and is held for 3 minutes.

4.10.1.7 DBI Test

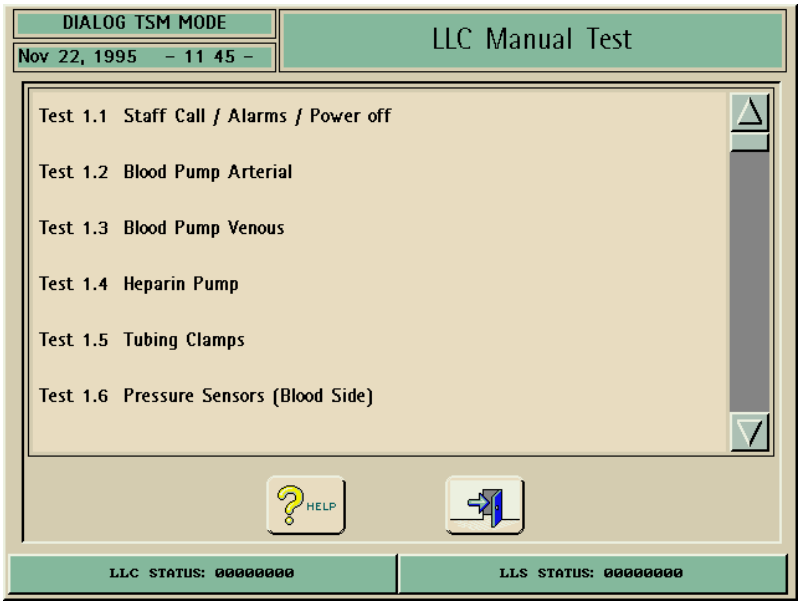
For detailed information regarding networking for Dialog machines see the technical information: Nexadia BSL Network and software for networking!

4.10.2 LLC Manual Test

You can test the function of the low level controller LLC sensors, pumps and valves. You can select a test menu and check a single (or where applicable combined) sensor, pump and valve. The components are displayed in graphics (position and corresponding value is displayed). Additionally you can directly skip to the *Low Level Calibration* menu with a *Calibration* key.



1. Activate the *Manual Test and Calibration* menu with the *Manual Test and Calibration* key in the *TSM Main Menu*. The following menu is displayed.

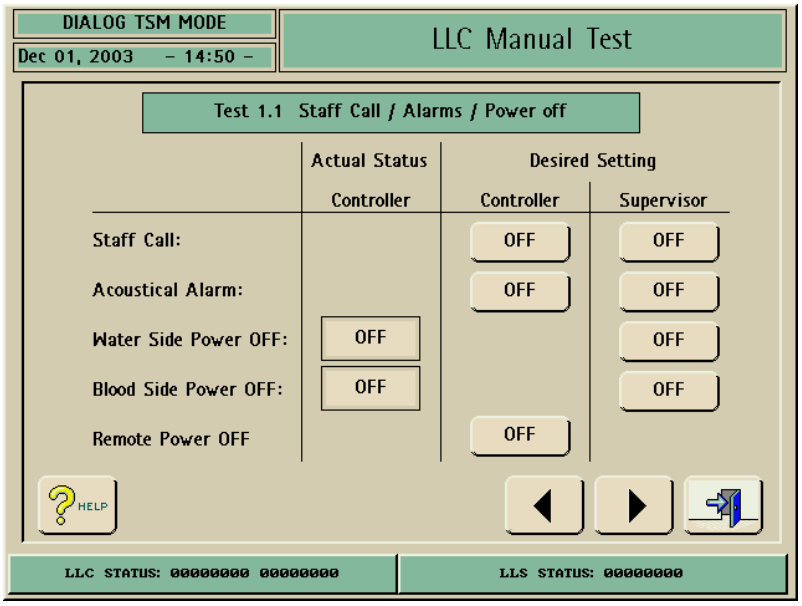

DIALOG TSM MODE
Nov 22, 1995 - 11 45 -
LLC Manual Test
Test 1.1 Staff Call / Alarms / Power off
Test 1.2 Blood Pump Arterial
Test 1.3 Blood Pump Venous
Test 1.4 Heparin Pump
Test 1.5 Tubing Clamps
Test 1.6 Pressure Sensors (Blood Side)
HELP
LLC STATUS: 00000000
LLS STATUS: 00000000

2. Activate the *LLC Manual Test* menu with the *LLC Manual Test* key in the *Manual Test and Calibration* menu. The following menu is displayed (if necessary use scroll bar).

The following tests can be selected:

- 1.1 Staff Call, Alarms, Power off
- 1.2 Blood Pump Arterial
- 1.3 Blood Pump Venous, Substitution Pump
- 1.4 Heparin Pump
- 1.5 Tubing Clamps
- 1.6 Pressure Sensors (Blood Side)
- 1.7 Air Sensor, Red Sensor
- 1.8 Coupling Detectors
- 1.9 Water Intake, Upline Tank and Flow Pump FPE
- 1.10 Degassing and Heating
- 1.11 Dialysis Temperature
- 1.12 Concentrate Pumps and Conductivity
- 1.13 Balance Chamber Valves
- 1.14 Bypass and Disinfection Valves
- 1.15 Flow Pump FPA, Balance Chamber and Air Separator
- 1.16 Pressure Water Part
- 1.17 UF Pump
- 1.18 Blood Leak
- 1.19 Leak Test
- 1.20 Water Part (Overview)
- 1.21 Emptying
- 1.22 HDF
- 1.23 BIC Cartridge Valve and Coupling Detectors
- 1.24 HDF Online
- 1.25 HDF Online Valves and Coupling Detectors
- 1.26 Option Rechargeable Battery
- 1.27 DFS Pressure Test of Therapy

4.10.2.1 Test 1.1 Staff Call, Alarms, Power Off



1. Activate the *Staff Call/Alarms/Power Off* menu with the *Staff Call/Alarms/Power Off* key in the *LLC Manual Test* menu. The following menu is displayed.
2. Check the functions with the appropriate keys.
3. Press the ◀ or ▶ key to skip to the last or to the next test point.

Staff Call/ Acoustical Alarm

The staff call can be activated with the *PRUF/PRUF-S* signal and the acoustical alarm can be switched separately with the *ACAL/ACAL-S* signal by the controller and supervisor.

Water Side Power OFF

The low level supervisor can test the power off for the 24 V supply voltage with the *D24OFF-S* signal for the dialysate side power off. The feedback to the controller (ON/OFF) shows whether the voltage was switched.

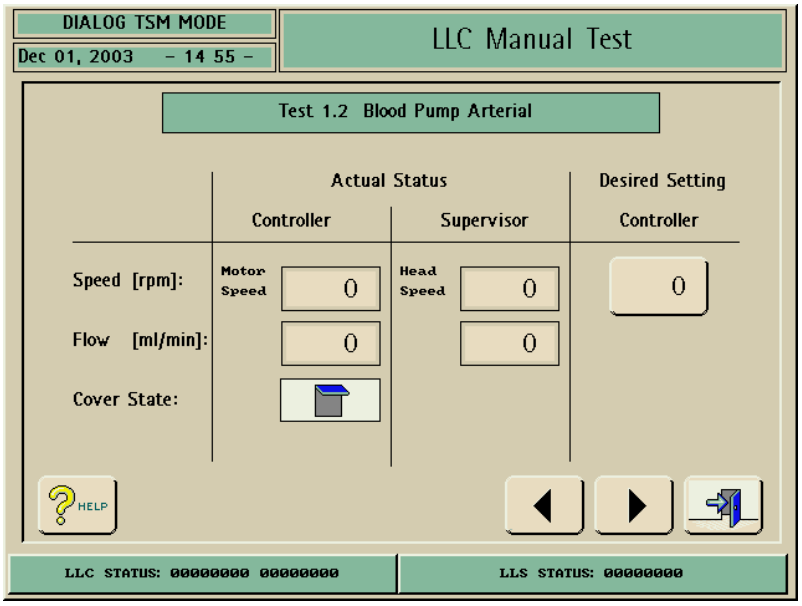
Blood Side Power OFF

The low level supervisor can test the power off for the 24 V supply voltage with the *B24OFF-S* signal for the blood side power off. The feedback to the controller (ON/OFF) shows whether the voltage was switched.

Remote Power OFF

The REMOTE signal for the remote power off can be activated by the controller. The machine is switched off by the internal real time clock RTC. The machine is switched on again after the shortest time period (approx. 64 s) has expired. The machine can be switched on immediately, if the machine is switched off and on again.

4.10.2.2 Test 1.2 Blood Pump Arterial



1. Activate the *Blood Pump Arterial* menu with the *Blood Pump Arterial* key in the *LLC Manual Test* menu. The following menu is displayed.
2. Check the functions with the appropriate keys.
3. Press the ◀ or ▶ key to skip to the previous or to the next test point.

Speed

You can select the speed of the arterial blood pump **BPA**. The controller displays the motor speed. The supervisor displays the head speed. The speed is kept stable via a hardware controller but it is not controlled to the desired set-point, i.e. the actual value does not have to correspond with the desired set-point value. The low level controller detects the motor speed via Hall sensors. These are integrated in the motor.

The supervisor detects the speed via a slot disk (with light barrier) assembled on the pump head axle. The conversion factor for the gear of the pump has a ratio of 1:46.65 between both actual values.

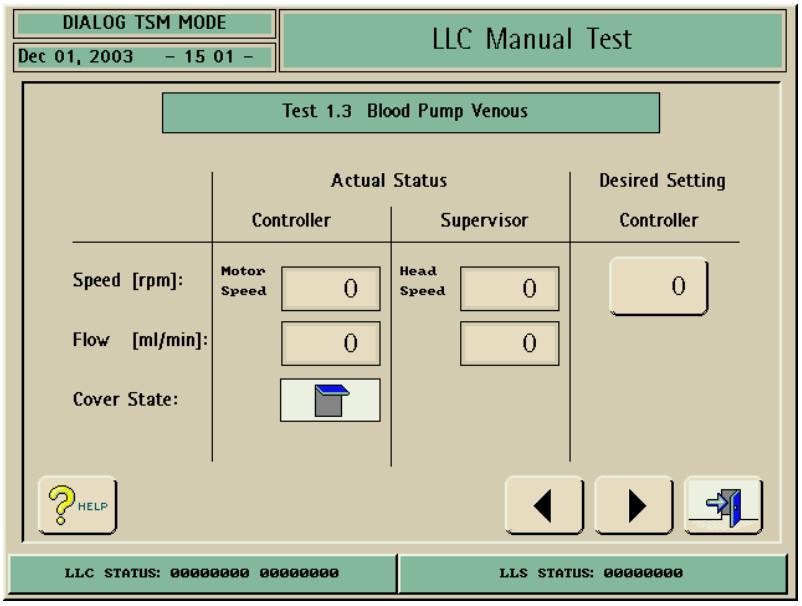
Flow

The controller displays the calculated flow rate.

Cover State

If the pump cover is opened the blood pump **BPA** is stopped. The low level controller detects and displays the opened pump cover.

4.10.2.3 Test 1.3 Blood Pump Venous, Substitution Pump



1. Activate the *Blood Pump Venous* menu with the *Blood Pump Venous* key in the *LLC Manual Test* menu. The following menu is displayed.
2. Check the functions with the appropriate keys.
3. Press the ◀ or ▶ key to skip to the previous or to the next test point.

The **BPV** pump has an own tubing factor for in substitution mode (*2.13 Flow of BPA and BPV/Substitution Pump* menu). The flow for the **BPV** substitution is displayed with this factor.

Speed — You can select the speed of the venous blood pump **BPV**/substitution pump. The controller displays the motor speed. The supervisor displays the head speed. The speed is kept stable via a hardware controller but it is not controlled to the desired set-point, i.e. the actual value does not have to correspond with the desired set-point value. The low level controller detects the motor speed via Hall sensors. These are integrated in the motor. The low level supervisor detects the speed via a slot disk (with light barrier) assembled on the pump head axle. The conversion factor for the gear of the pump has a ratio of 1:46.65 between both actual values.

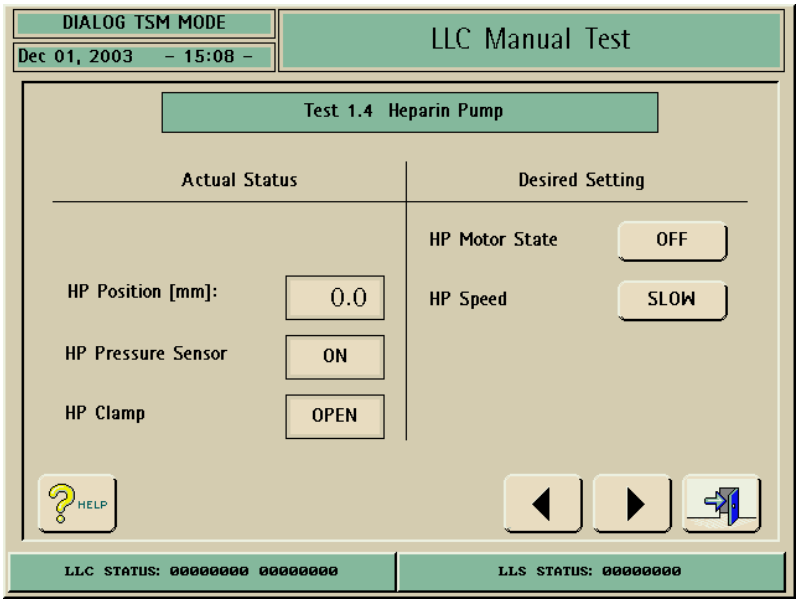
Cover State — If the pump cover is opened the blood pump **BPV**/substitution pump is stopped. The low level controller detects and displays the opened pump cover.

4.10.2.4 Test 1.4 Heparin Pump

Heparin Pump Compact

The heparin pump type is selected in *LLC Manual Calibration*, *Calibration 2.2 Heparin Pump*, *Heparin Pump Type*, *Heparin Pump Type Selection*:

- Heparin Pump Comfort
- Heparin Pump Compact



1. Activate the *Heparin Pump* menu with the *Heparin Pump* key in the *LLC Manual Test* menu. The following menu is displayed for the heparin pump Compact.
2. Check the functions with the appropriate keys.
3. Press the ◀ or ▶ key to skip to the previous or to the next test point.

HP Position [mm]
: The forward feed distance is displayed in mm (only if the syringe is inserted and locked). The counter is reset if the lock sensor is opened. The distance is detected from the signal of the light barrier on the motor axle.

HP Syringe Sensor
: The sensor for the sensor plate of the syringe detects an inserted syringe.

Lock Sensor
: Sensor to open the clasp nut.
(The clasp nut is assembled on the drive spindle and limits the max. pressure load of the heparin pump).

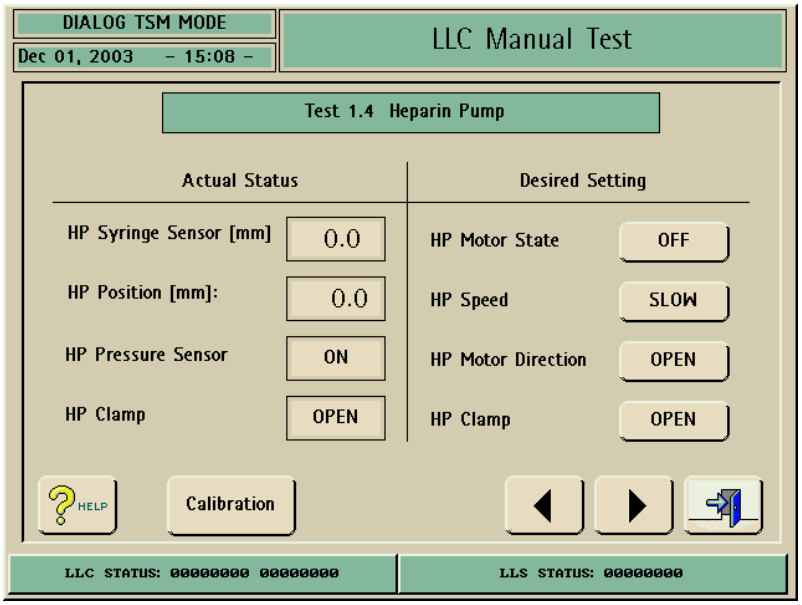
HP Motor State
: Activates/switches off the heparin pump.

HP Speed
: Selection between slow and fast forward feed.

Heparin Pump Comfort

The heparin pump type is selected in *LLC Manual Calibration*, *Calibration 2.2 Heparin Pump*, *Heparin Pump Type*, *Heparin Pump Type Selection*:

- Heparin Pump Comfort
- Heparin Pump Compact



1. Activate the *Heparin Pump* menu with the *Heparin Pump* key in the *LLC Manual Test* menu. The following menu is displayed for the heparin pump Comfort.
2. Check the functions with the appropriate keys.
3. Press the ◀ or ▶ key to skip to the previous or to the next test point.

You can skip directly to the calibration of the heparin pump Comfortby pressing the Calibration key.

HP Syringe Sensor — The syringe diameter is displayed in mm with the *HPSP* signal. If there is no syringe in the heparin pump a value < 13 mm must be detected.

HP Position — If the syringe holder is completely opened a value > 39 mm must be detected. Thereby the software can recognize an opened syring holder.

HP Pressure Sensor — The *HPKOLB* signal detects if the drive push button is driven against a syringe plunger.

HP Clamp — The clamps for the syringe are open/closed with the *HPKRALLOZU* signal. The clamp position must be recognized with the *HPKRALLO* signal.

HP Motor State — The motor current is switched by the *HPON* signal for the stepper motor drive.

HP Speed — You can switch to two different speeds to check the basic drive functions of the heparin pump.

HP Motor Direction — The motor direction is switched by the *HPMORI* signal for the stepper motor drive.

If necessary switch the Dialog off and on again to repeat the test for the heparin pump. The *HP Speed* must be set to *SLOW* prior to a new setting.

Heparin Pump Position Open and Closed

1. Switch the *HP Motor Direction* key to *OPEN* and the *HP Speed* to *FAST*. Switch *HP Motor Sate* key to *ON*.
   Wait until the *OPEN* position is reached.
   Switch the *HP Speed* to *SLOW*.
   The *HP Position [mm]* must display 0 mm.
2. Open and close the *HP Clamp* with the *OPEN/CLOSED* key and check the *Actual Status* of the *HP Pressure Sensor ON/OFF* and *HP Clamp OPEN/CLOSED*.
   Manually press the pressure push button on the heparin pump and check the *Actual Status* of the *HP Pressure Sensor ON/OFF*.

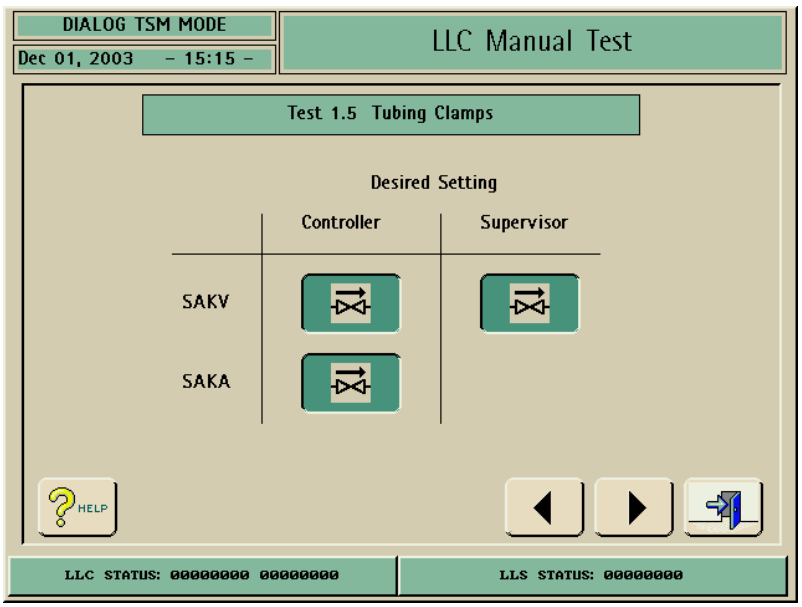
3. Switch the *HP Motor Direction* key to *CLOSED* and the *HP Speed* to *FAST*.
   Open and close the *HP Clamp* 3 times during the opening procedure and check the *Actual Status* values.
   Wait until the closed position is reached.
   Switch the *HP Speed* to *SLOW*.
   The *HP Position [mm]* must display 120 mm ± 3 mm.

4. Switch the *HP Motor Direction* key to *OPEN* and the *HP Speed* to *FAST*.
   Open and close the *HP Clamp* 3 times during the opening procedure and check the *Actual Status* values.
   Wait until the *OPEN* position is reached.
   Switch the *HP Speed* to *SLOW*.
   The *HP Position [mm]* must display 0 mm (+ 1 mm).

Check Inserted Syringe

5. Insert a syringe. Switch the *HP Motor Direction* key to *CLOSED* and the *HP Speed* to *FAST*.
   Check the *HP Pressure Sensor* (*ON/OFF*) when the syringe was recognized.
   Check the inserted syringe. The syringe must have a range ≤ 1 ml in the *CLOSED* position.

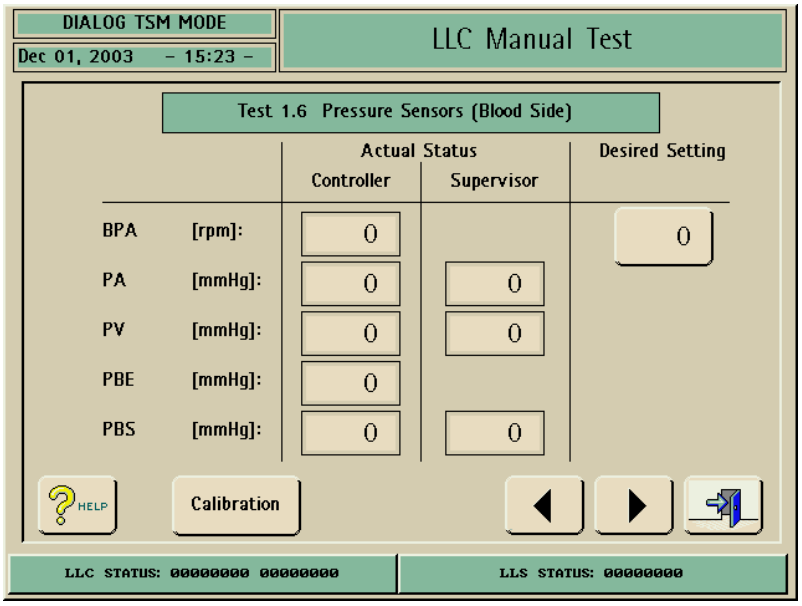
4.10.2.5 Test 1.5 Tubing Clamps



1. Activate the *Tubing Clamps* menu with the *Tubing Clamps* key in the *LLC Manual Test* menu. The following menu is displayed.
2. Check the functions with the appropriate keys.
3. Press the or key to skip to the previous or to the next test point.

Tubing Clamps	The venous tubing clamp **SAKV** and arterial tubing clamp **SAKA** can be closed and opened. Thereby the switch function and leakage test (pressure - clamp gap, time) can be tested. The closed clamp gap is set to 1.4 mm + 0.1 mm.

4.10.2.6 Test 1.6 Pressure Sensors (Blood Side)



1. Activate the *Pressure Sensors (Blood Side)* menu with the *Pressure Sensors (Blood Side)* key in the *LLC Manual Test* menu. The following menu is displayed.
2. Check the functions with the appropriate keys.
3. Press the ◀ or ▶ key to skip to the previous or to the next test point.

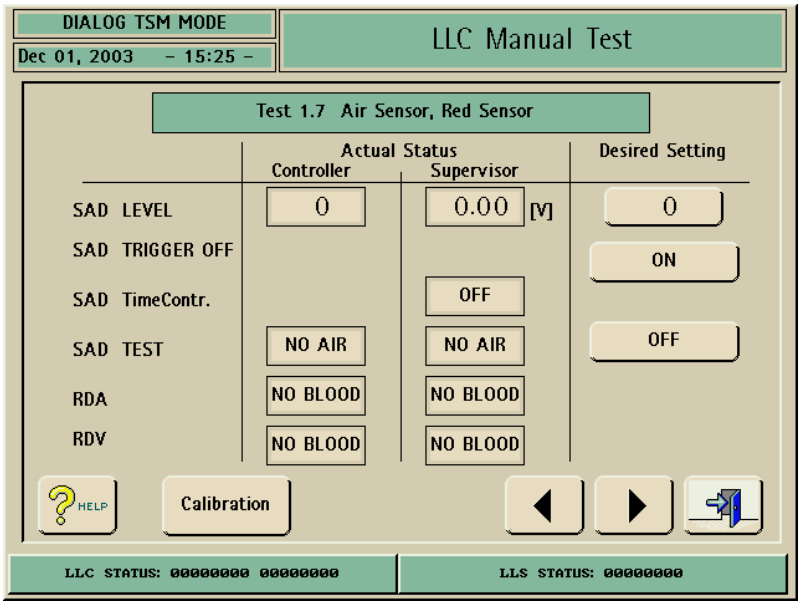
You can skip directly to the calibration of the sensors by pressing the Calibration key.

Pressure Sensors

The values of the pressure sensors **PA**, **PV**, **PBE** and **PBS** are displayed. The sensor pressure can be tested with a syringe.

The value for **PBS** is 0 if **PBS** was not activated in the *2.1 Pressure Sensors (Blood Side)* menu.

4.10.2.7 Test 1.7 Air Sensor SAD, Red Sensor



1. Activate the *Air Sensor, Red Sensor* menu with the *Air Sensor, Red Sensor* key in the *LLC Manual Test* menu. The following menu is displayed.
2. Check the functions with the appropriate keys.
3. Press the ◀ or ▶ key to skip to the previous or to the next test point.

You can skip directly to the calibration of the safety air detector **SAD** by pressing the Calibration key.

Safety Air Detector Version 1 and 2

The safety air detector type is selected in *LLC Manual Calibration*, *Calibration 2.9 Safety Air Detector SAD*, *SAD Type*:

- SAD with variable alarm level (version 1)
- SAD with fixed alarm level (version 2)

SAD with Fixed Alarm Level (Version 2)

The calibration of both SADs depends on the SAD types. The calibration level (example KS = 48) on the SAD is entered for the SAD with a fixed alarm level (version 2). The alarm level is automatically set to 15 digits (software < 6.21 = 10 digits) after the calibration value is entered. The test level is calculated by adding 5 digits to the calibration level (test level = KS + 5 digits). You can find the detailed description and procedure for the calibration of the SAD version 2 in the menu: *LLC Manual Calibration*, *Calibration 2.9 Safety Air Detector SAD*.

SAD Test

Activate the internal test of the safety air detector **SAD** with the *SAD TEST* key (the switch level is automatically increased), i.e. air must always be detected.

SAD Trigger OFF

The cyclic measurement of the controller can be checked with the *SAD TRIGGER OFF* key.

SAD Messung

The cyclic measurement is checked by the controller and must be detected by the supervisor with the *SAD Time Contr.*

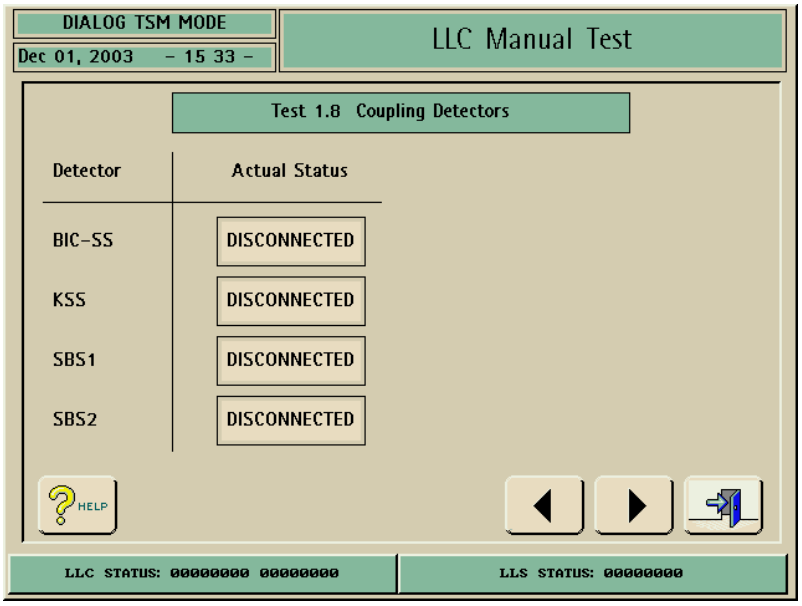
SAD Test

AIR must be detected if the *SAD TEST* is activated. The sensitivity can be changed to check the scwitching point.

AIR
AIR must be detected if a tubing filled with air is inserted.

NO AIR
NO AIR must be detected if a tubing filled with fluid is inserted.

4.10.2.8 Test 1.8 Coupling Detectors



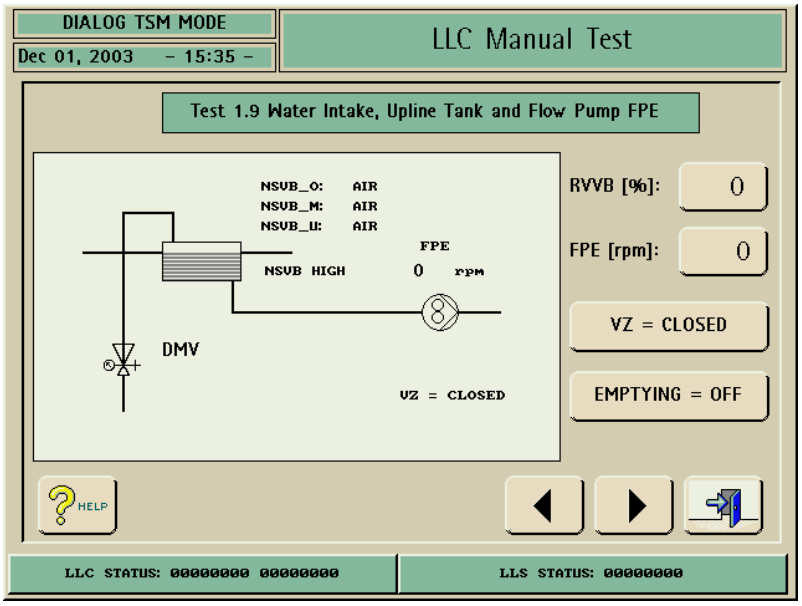
1. Activate the *Coupling Detectors* menu with the *Coupling* key in the *LLC Manual Test* menu. The following menu is displayed.
2. Check the functions of the reed contacts with the appropriate couplings.
3. Press the ◀ or ▶ key to skip to the previous or to the next test point.

You can check the actual status of the reed sensors:

Detectors

- **BIC SS** Bicarbonate rinsing connection sensor
- **KSS** Concentrate rinsing connector sensor
- **SBS1/2** Rinsing bridge connector sensor (dialyser couplings)

4.10.2.9 Test 1.9 Water Inlet, Upline Tank and Flow Pump FPE



1. Activate the *Water Inlet* menu with the *Water Inlet* key in the *LLC Manual Test* menu. The following menu is displayed.
2. Check the functions with the appropriate keys.
3. Press the ◀ or ▶ key to skip to the previous or to the next test point.

You can set the flow of the upline tank control valve **RVVB**. **RVVB** must guarantee a flow of ≥ 1200 ml/min at a water inlet pressure of approx. 1.3 bar. The pressure reducer valve is set to 1.3 bar.

The level of the upline tank **VB** is displayed on the screen by the level sensors (**NSVB** high, medium and low).

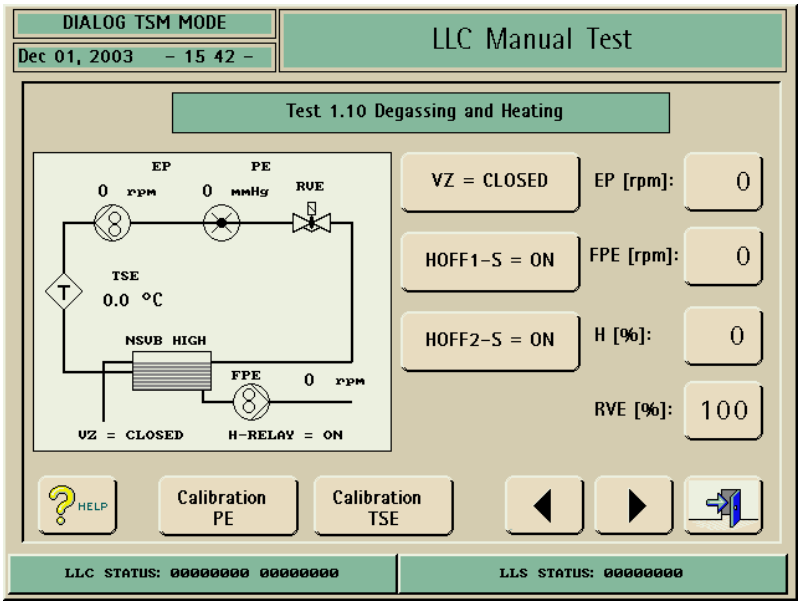
If the upline tank is full the valve **RVVB** is closed automatically. If the flow pump **FPE** is activated **FPA** is also switched on, to allow an unrestricted flow through the balance chambers.

The degassing pump **PE** is permanently switched on to allow a circulation in both compartments of the upline tank.

RVE is opened. If the emptying is activated to drain the machine the pumps are switched on for a short period and **RVVB** closed.

All balance chamber valves are opened and the outlet flow pump **FPA** works in main flow with the same speed as the inlet flow pump **FPE**. The degassing pump **EP** runs and the degassing control valve **RVE** is open.

4.10.2.10 Test 1.10 Degassing and Heating



1. Activate the *Degassing and Heating* menu with the *Degassing and Heating* key in the *LLC Manual Test* menu. The following menu is displayed.
2. Check the functions with the appropriate keys.
3. Press the ◀ or ▶ key to skip to the previous or to the next test point.

You can skip directly to the calibration of the pressure sensor **PE** or the temperature sensor **TSE** by pressing the appropriate Calibration PE or Calibration TSE key.

The components of the degassing and heating circuit can be tested step by step.

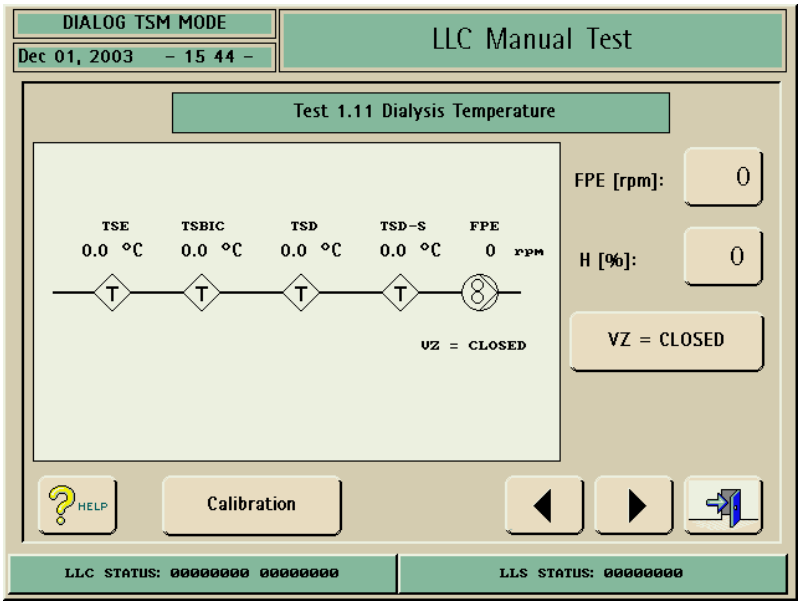
All balance chamber valves are switched so that one half of the balance chamber is open and the other side closed to position the membrane.

The flow pump **FPE** and **FPA** have the same speed and work in main flow. If the speed of **FPE** is set the degassing pump **EP** starts automatically with a higher speed.

The heater **H** is stopped if the degassing pump **EP** < 500 min^{-1}, the degassing temperature sensor **TSE** > 89 °C, degassing control valve **RVE** < 30 % or the upline tank VB is empty.

The degassing pump **EP** must be able to build up a flow of > 1200 ml/min at a negative pressure of - 400 mmHg.

4.10.2.11 Test 1.11 Dialysis Temperature



1. Activate the *Dialysis Temperature* menu with the *Dialysis Temperature* key in the *LLC Manual Test* menu. The following menu is displayed.
2. Check the functions with the appropriate keys.
3. Press the ◀ or ▶ key to skip to the previous or to the next test point.

You can skip directly to the calibration of the temperature sensors **TSBIC/ TSD/TSD-S** by pressing the Calibration key.

The dialysate is heated up with the set heater power **H %**.

The flow pumps **FPE/FPA** work with the set speed. The balance chambers are opened and the machine works in main flow.

The temperature must be controlled by the heater to a stable set-point to test the temperature sensors.

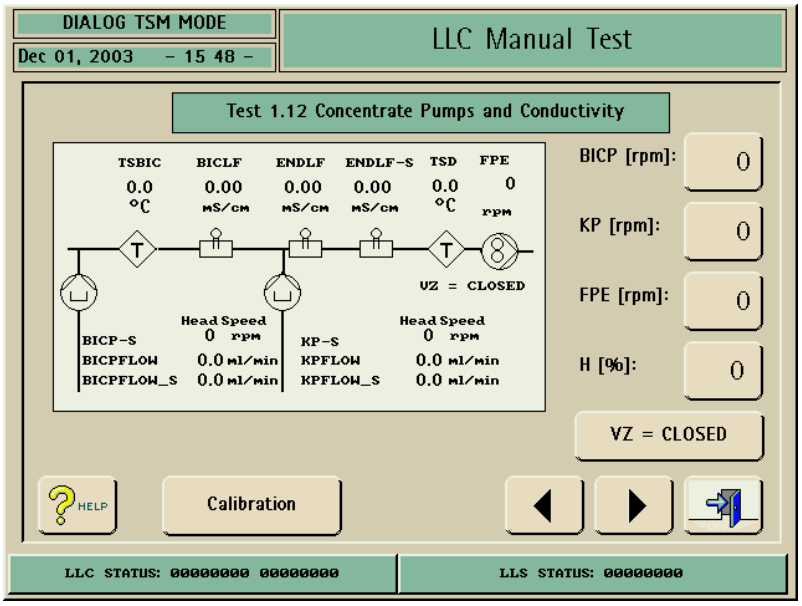
If you open the circulation valve **ZV** a closed flow circuit is achieved (via the upline tank). The flow pump **FPE** should be set to 1500 min^{-1}.

The temperature sensors must be in the measurement range of + 32 to + 44 °C with a deviation of > - 1.5 °C and < + 0.5 °C.

The measurement range is as follows:

TSE, TSD, **TSBIC**: 0 to 100 °C
TSD-S: 30 to 55 °C

4.10.2.12 Test 1.12 Concentrate Pumps and Conductivity



1. Activate the *Concentrate Pumps and Conductivity* menu with the *Concentrate Pumps and Conductivity* key in the *LLC Manual Test* menu. The following menu is displayed.
2. Check the functions with the appropriate keys.
3. Press the ◀ or ▶ key to skip to the previous or to the next test point.

You can skip directly to the calibration of the conductivity sensors **BICLF/ENDLF** by pressing the Calibration key.

You can set the pumps **BICP/KP**, flow pump **FPE** and the heater power **H %**.

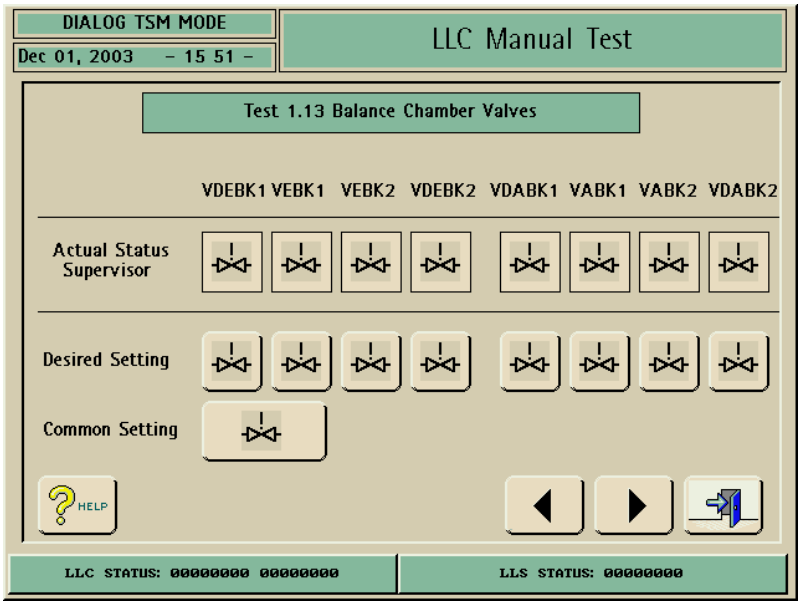
All balance chamber valves are open and the flow pump **FPA** works with the same speed as **FPE**.

The machine is in main flow. The machine can suck-in concentrate with the concentrate pumps **BICP/KP** for the preparation of the conductivity to test the conductivity sensors **BICLF/ENDLF/ENDLF-S**.

You can connect a dialysis measurement instrument at the dialyser couplings or between **FPE** and the balance chamber.

The supervisor displays the head speed **BICP-S/KP-S** of the concentrate pumps. Set the speed of the flow pump **FPE** to 1500 min^{-1}. Thereby the pulsating flow of the pumps have no influence on the conductivity measurement.

4.10.2.13 Test 1.13 Balance Chamber Valves

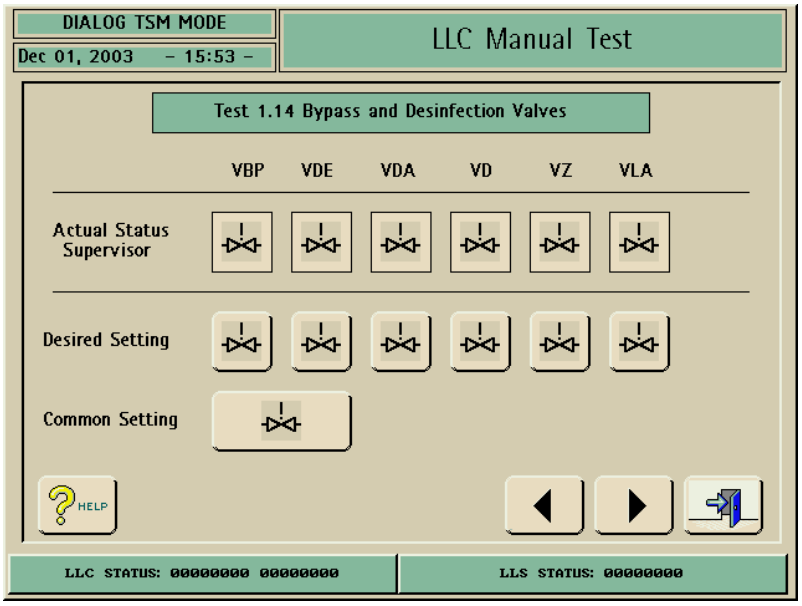


1. Activate the *Balance Chamber Valves* menu with the *Balance Chamber Valves* key in the *LLC Manual Test* menu. The following menu is displayed.
2. Check the functions with the appropriate keys.
3. Press the ◀ or ▶ key to skip to the previous or to the next test point.

You can activate a single valve or combined setting via the controller. The actual condition is displayed by the supervisor. The following valves can be activated:

Valves	**VDEBK1/2**	Dialyser inlet valve balance chamber
	VEBK1/2	Inlet valve balance chamber
	VDABK1/2	Dialyser outlet valve balance chamber
	VABK1/2	Outlet valve balance chamber

4.10.2.14 Test 1.14 Bypass and Disinfection Valves



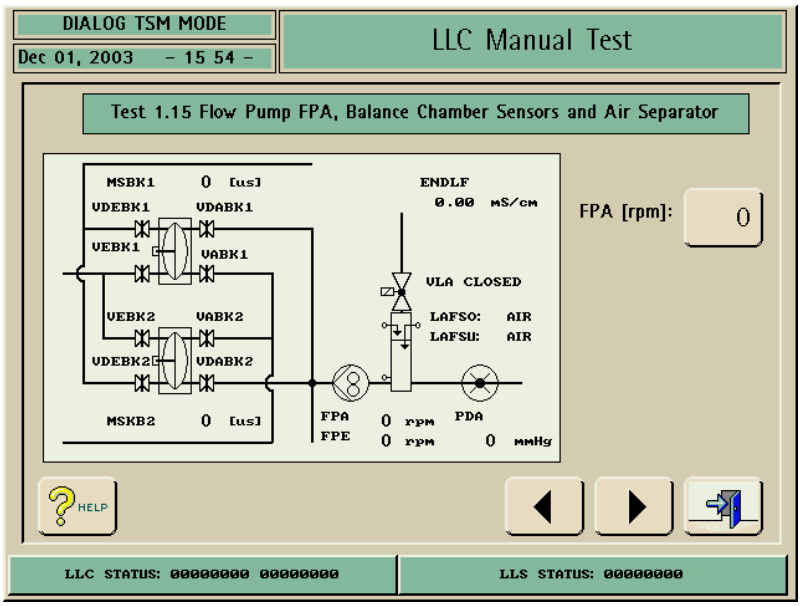
1. Activate the *Bypass and Disinfection Valves* menu with the *Bypass and Disinfection Valves* key in the *LLC Manual Test* menu. The following menu is displayed.
2. Check the functions with the appropriate keys.
3. Press the or key to skip to the previous or to the next test point.

You can activate a single valve or combined setting via the controller. The actual condition is displayed by the supervisor. The following valves can be activated:

Valves

VBP	Bypass valve
VDE	Dialyser inlet valve
VDA	Dialyser outlet valve
VD	Disinfection valve
VZ	Circulation valve
VLA	Ais separator valve

4.10.2.15 Test 1.15 Flow Pump FPA, Balance Chamber Sensors and Air Separator



1. Activate the *Flow Pump FPA, Balance Chamber Sensors and Air Separator* menu with the *Flow Pump FPA, Balance Chamber Sensors and Air Separator* key in the *LLC Manual Test* menu. The following menu is displayed.
2. Check the functions with the appropriate keys.
3. Press the ◀ or ▶ key to skip to the previous or to the next test point.

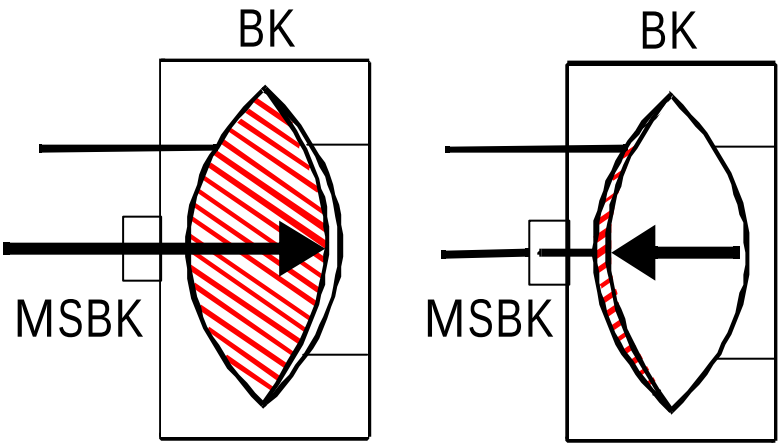


Fig. : Switch Point MSBK1/2

If the test (initialisation) is started the switching point of the membrane position sensor balance chambers **MSBK1/2** are detected. If the maximum stroke of **MSBK1/2** is reached the balance chamber valves are automatically switched (see figure).

Phase 1

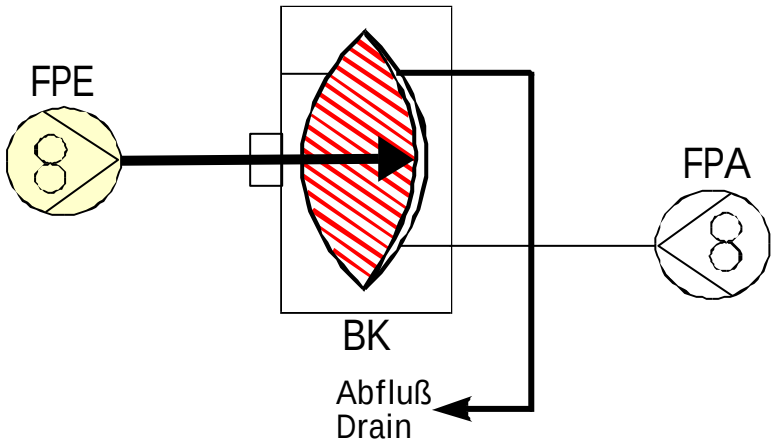


Fig. : Filling Cycle Balance Chamber Phase 1

If you set the flow pump **FPA** the left side of one of the balance chambers is filled by the flow pump **FPE**. Simultaneously the fluid in the right side of the balance chamber is emptied to the drain.

Phase 2

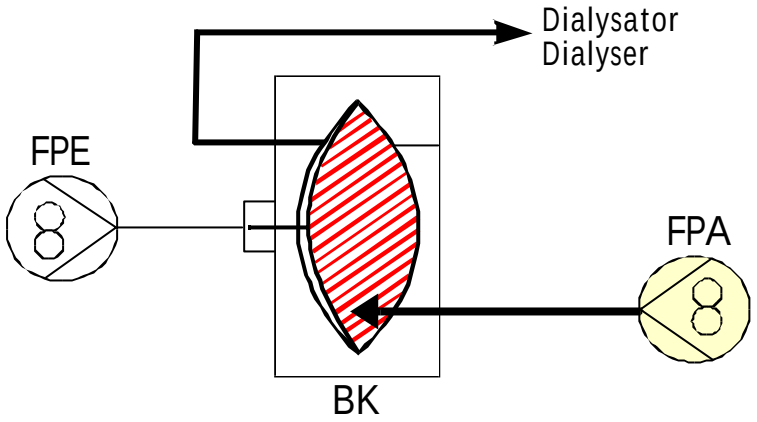


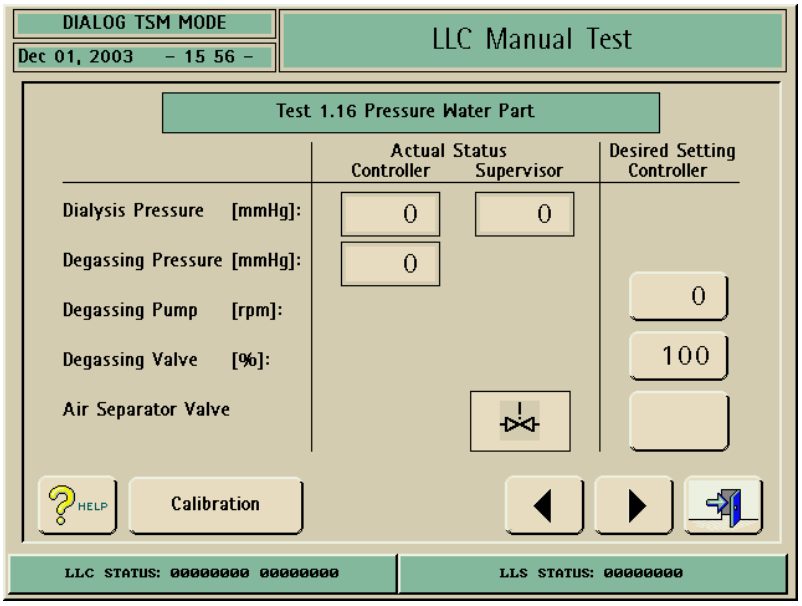
Fig. : Filling Cycle Balance Chamber Phase 2

The right side of the balance chamber is filled with the fluid from the dialyser by the flow pump **FPA**. Simulataneuosly the fresh fluid in the left side of the balance chamber is delivered into the dialyser circuit.

The concentrate pump **KP** is set to a fixed speed of 20 min^{-1} during this test. Thereby a final conductivity **ENDLF** of > 0.5 mS/cm is obtained if concentrate is connected.

This conductivity is required to test the level sensors in the air separator **LA**. If the lower level sensor **LAFSU** is activated the air separator valve **VLA** is opened and the balance chamber valves are switched. Thereby **FPE** delivers fluid into the dialyser circuit. **VLA** is only closed and switched to normal operation if the top level sensor **LAFSO** detects fluid.

4.10.2.16 Test 1.16 Pressure Water Part



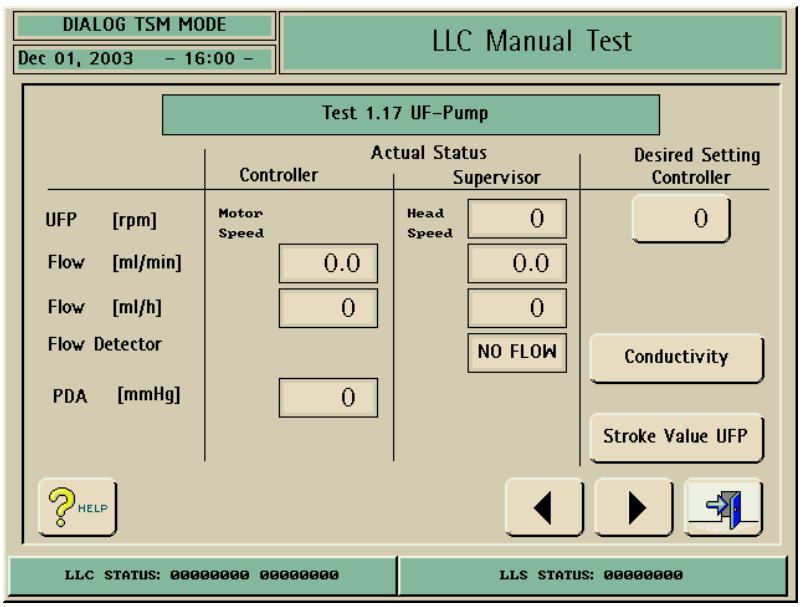
1. Activate the *Pressure Water Part* menu with the *Pressure Water Part* key in the *LLC Manual Test* menu. The following menu is displayed.
2. Check the functions with the appropriate keys.
3. Press the or key to skip to the previous or to the next test point.

You can skip directly to the calibration of the pressure sensors **PE/PDA** by pressing the Calibration key.

The degassing pump **EP** and the degassing control valve **RVE** can be set. The air separator valve **VLA** can be opened/closed. A negative pressure can be obtained via the degassing pump **PE** to test the degassing presure sensor **PE** and the outlet dialysate fluid pressure sensor **PDA**. If **VLA** is opened the negative pressure is also present at **PDA**. If fluid is in the connection line between the air separator and degassing circuit the fluid column leads to a higher pressure at **PE**, according to the level difference.

A dialysis measurement instrument should be connected to the dialyser couplings for the pressure measurement.

4.10.2.17 Test 1.17 UF Pump



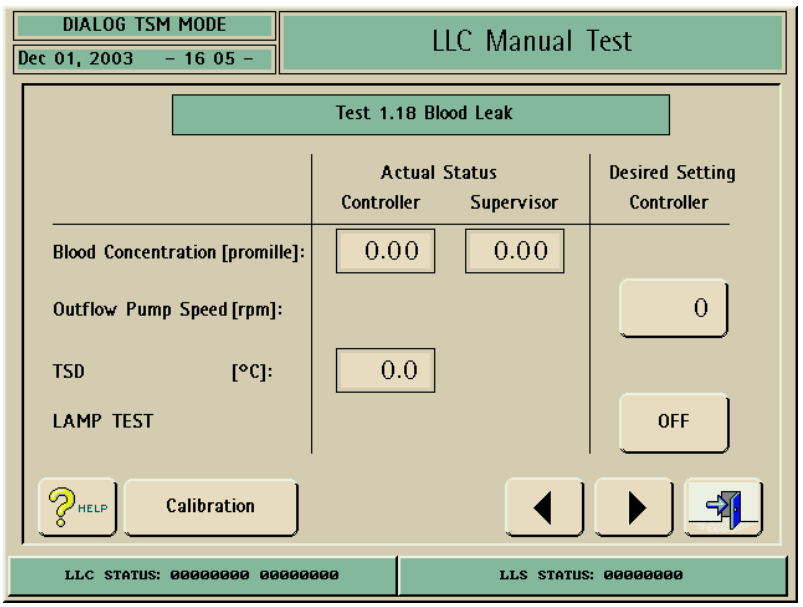
1. Activate the *UF-Pump* menu with the *UF-Pump* key in the *LLC Manual Test* menu. The following menu is displayed.
2. Check the functions with the appropriate keys.
3. Press the or key to skip to the previous or to the next test point.

You can set the speed of the **UF** pump **UFP**. The head speed and the calculated flow is displayed. At the beginning of the test the balance chambers are initialised. The flow pumps **FPE/FPA** are activated to reach the prepressure for **UFP**, set by the value of the throttle **DDE**.

The *Flow Detector* **FM** is only present in machines with the option HDF bag. **FM** detects a fluid flow if **UFP** runs.

The *Stroke Value UFP* should not be used in a normal case, because **UFP** must be calibrated (see LLC manual calibration).

4.10.2.18 Test 1.18 Blood Leak



1. Activate the *Blood Leak Detector* menu with the *Blood Leak Detector* key in the *LLC Manual Test* menu. The following menu is displayed.
2. Check the functions with the appropriate keys.
3. Press the or key to skip to the previous or to the next test point.

You can check the following functions of the blood leak detector:

- Red and green LED
- Receiver circuit
- Optical efficiency of the detector block

You can skip directly to the calibration of the blood leak detector by pressing the Calibration key.

Blood Leak Detector 1 and 2

The safety air detector type is selected in *LLC Manual Calibration*, *Calibration 2.7 Blood Leak Detector SAD*, *BL Type*:

- No automatic adjustment (type 3810 6515)
- Automatic adjustment in preparation (type 3810 6515)
- BL type 2 with automatic adjustment (type 3824 3784/art. no. 3451 908X)

Blood Leak Detector 2

A Dialog software version number ≥ 3.46 is required for the blood leak detector 2. The blood leak detector 2 performs an automatic calibration of the zero point with a reference diode.

The blood leak detector 2 can be checked and calibrated. The rinsing block must have an even temperature for calibration. If both dialyser couplings are connected to the rinsing bridge the flow pumps (**FPA**/**FPE**) work in main flow.

If only one coupling is connected **FPE** is stopped. The test solution can be sucked in by the second coupling via **FPA**. The first calibation point must be performed with clean water.

A function test and a calibration is performed for the blood leak detector 2.
If an actual value is out of limits during the function test exchange the blood leak detector 2.
Check the blood leak detector 2 after a citro-thermal disinfection (*LLC Manual Test*, *Test 1.18 Blood Leak Detector*).
Close front and rear door for the function test to prevent light irradiation on the sensor.

Leakages

Air and micro-bubbles can lead to false measurement values in the measurement line and can cause fluctuation of the actual value.
If air is visible check the complete system for leaks in menu 1.20 Test Water Part.
After the initialisation phase rinse the blood leak detector approx. 1 min and then perform a leakage test of the system in menu 1.19 Leak Test.

Check Blood Leak Detector Type 2

1. Connect both dialyser couplings to the rinsing bridge.
2. Select menu 1.18 in TSM to perform a function check of the blood leak detector.
3. Rinse the blood leak detector BL for approx. 1 min at the beginning of the rinsing time with flow pump outlet **FPA** = 2000 min^{-1}. Thereby possible air bubbles in the system are removed.
4. Rinse blood leak detector for approx. 15 to 30 min with FPA = 1000 min^{-1} to warm up the complete system to a temperature of approx. 40 °C.
5. The *LED Test* is activated with the *LED TEST OFF* key. The *OFF* key switches to the *RED* key as soon as the key is pressed.

   The *red LED* is tested after 10 s. The controller value for the switched off *red LED* must be as follows (the supervisor value is uncritical):

red LED	Actual Status Controller
Blood Concentration	< 4.00

6. Press the *LED TEST RED* key to switch to the *green LED*. The *RED* key switches to the *GREEN* key.

   The *green LED* is tested. The controller value for the switched off *green LED* must be as follows (the supervisor value is uncritical):

green LED	Actual Status Controller
Blood Concentration	> 2.06

7. The actual controller values for the *red LED* and the *green LED* must be divided.

   The calculated value must be in the following limits (to the first decimal digit/round off):

red LED / green LED
1.2 - 1.4

Exchange the blood leak detector type 2 if one of these three values are out of limits.

Check Blood Leak Detector Type 1

1. The *LED Test* is activated with the *LED TEST OFF* key. The *OFF* key switches to the *RED* key when pressed. The blood concentration value for the detector signal is displayed for approx. 10 s.

   The blood concentration value of the controller for the switched off LEDs must be as follows (the supervisor value is uncritical):

Both LEDs switched off	Low Level Controller
Blood Concentration Value	< 0.05

   The *red LED* is automatically activated after 10 s. The controller value for the switched off *red LED* must be as follows (the supervisor value is uncritical):

red LED	**Low Level Controller**
Blood Concentration Value	2.75 to 3.25

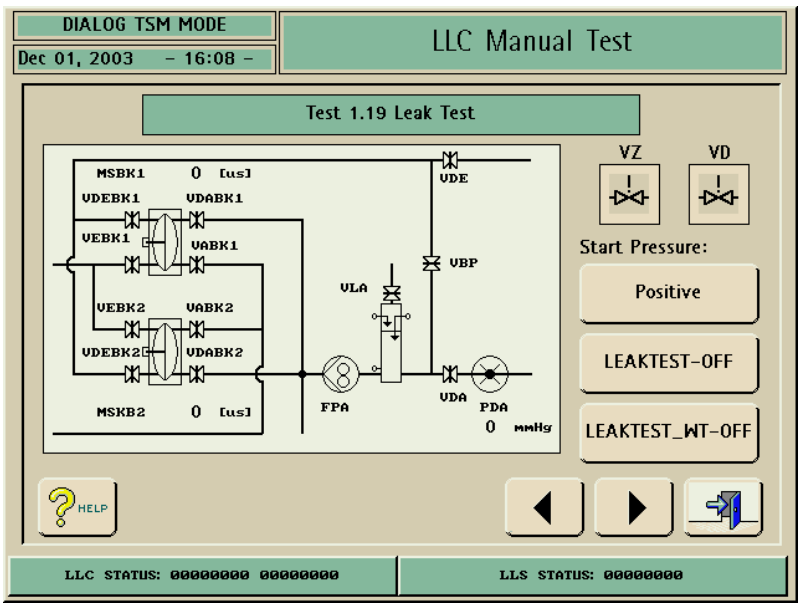
2. Press *LED TEST RED* key, to switch to the *green LED*. The *RED* key switches to the *GREEN* key.

   The *green LED* is tested. The controller value for the switched off *green LED* must be as follows (the supervisor value is uncritical):

green LED	**Low Level Controller**
Blood Concentration Value	2.00 to 2.50

If values deviate a calibration may be possible via the potentiometers at the blood leak detector type 1 (see also low level calibration).

4.10.2.19 Test 1.19 Leak Test



1. Activate the *Leak Test* menu with the *Leak Test* key in the *LLC Manual Test* menu. The following menu is displayed.
2. Check the functions with the appropriate keys.
3. Press the or key to skip to the previous or to the next test point.

You can run a leakage test for the balance chamber system, the bypass valve **VBP** and the main flow valves **VDE/VDA**, the air separator valve **VLA** and the UF pump **UFP**. The flow system must be filled with water prior to the leakage test (if necassary fill in menu *1.20 Water Part Overview*).

Leak Test

The following components are tested:

Membrane position sensors:	**MSBK1/2**
Balance chamber valves:	**VDEBK1/2, VDABK1/2, VEBK1/2, VABK1/2**
Bypass valve:	**VBP**
Dialyser in/output valves:	**VDE, VDA**
Disinfection valve:	**VD**
Air separator valve:	**VLA**
* Membrane leakproof test:	**VDEBK/VABK** (opened) **VDABK/VEBK/VLA** (closed)

(*If *Start Pressure Positive* was set: An additional membrane leakproof test is performed after the second test step.)

Start Pressure Positive

If the test is activated for the dialysate circuit an automatic leakage test is performed. The test is started with a positive test pressure and then followed by a negative test pressure.

If the test is started with a positive test pressure an additional test step is performed after the second test step. This additional step performs a leakproof test of the membranes. The valves have the following position during the test:

- **VDEBK/VABK**: opened
- **VDABK/VEBK/VLA**: closed

The test pressure is present in the inlet balance chamber during this test. The membrane seals the outlet of the test circuit. A defective membrane would cause a pressure drop.

HDF Online
HDF online machines: the two additional test steps **2a** and **2b** are performed after the membrane test. Thus the valves **VDFF**, **VSB**, **VSAE** and **VSAA** and the substitution port are checked.

Start Pressure Negative

If the test is activated for the dialysate circuit an automatic leakage test is performed. The test is started with a negative test pressure and then followed by a positive test pressure.

LLC Alarm

The leakage test consists of three test steps. If an error occurs an LLC alarm is activated (LLC Status 00020000).

Test Procedure Positive Test Pressure

- A positive pressure is built up with the **FPE** pump.
- The pump is stopped and the valves closed if the set-point pressure for **PDA** = +400 mmHg is reached.
- The **PDA** reference value is stored after a wait state of 5 s.
- This reference value is compared with the actual value after 30 s.
- If the deviation is < 10 mmHg the next test step is performed.

Test Step 1 **VLA**, **VEBK1/2, VABK1/2** ----------closed

Test Step 2 **VLA, VDEBK1/2, VDABK1/2** ----------closed

Note
Only if start pressure was positive

After the second test step a leakproof test of the membranes is performed. The valves have the following position:

VDEBK/VABK: ---------- opened
VDABK/VEBK/VLA: ---------- closed

Test Step 2a **Note**
Test step 2a and 2b only for HDF online machines.

VLA Air separator valve: ---------- closed
VDFF DF filter valve: ---------- closed
VSB Substitution bypass valve: ---------- closed
VSAE Substitution connection inlet valve: --- closed

Test Step 2b **VLA** Air separator valve: ---------- closed
VDFF DF filter valve : ---------- closed
VSB Substitution bypass valve: ---------- closed
VSAA Substitution connection outlet valve: - closed

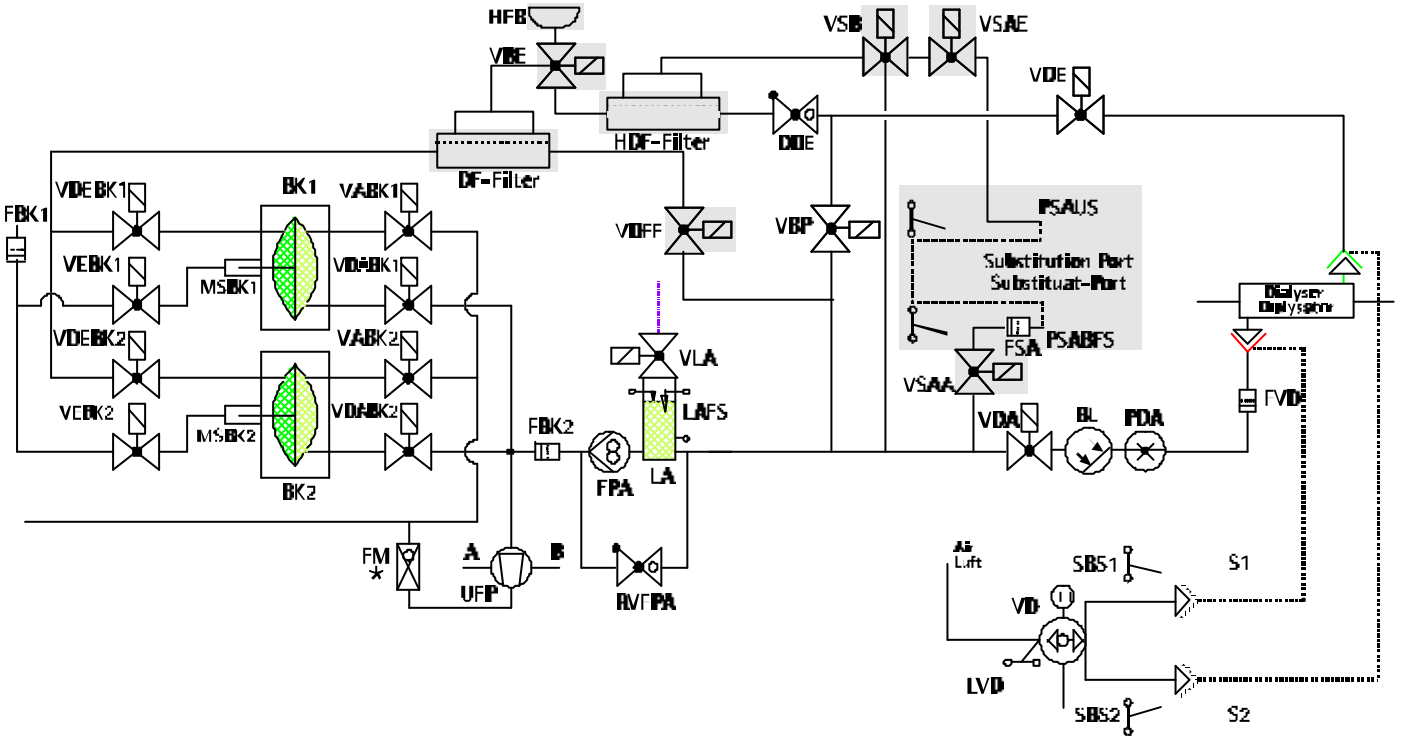


Fig.: Excerpt Flow Diagram for HDF Online

Test Step 3 **VLA**, **VDE, VDA** ----------closed

Negative Test Pressure Test Steps 1 to 3

The valve switching is identical with the above description.

- Negative pressure is built up with the UF pump after the third test step.
- The pump is stopped and the valves are closed if the set-point pressure for **PDA** = - 400 mmHg is reached.
- The **PDA** reference value is stored after a wait state of 5 s.
- This reference value is compared with the actual value after 30 s.
- If the deviation is < 10 mmHg the next test step is performed.

Leak Test Heat Exchanger

The following component is tested:

Heat Exchanger: **WT**

Manual Leakage Test Heat Exchanger (WT)

a) Rinse the flow circuit with water prior to the leakage test, to prevent air bubbles in the test area.

b) Close all valves in the Dialog (switch off machine).

c) Connect a manometer and a syringe filled with water to the water outlet.

d) Build up a test pressure 400 mmHg (+ 50 mmHg) with the syringe and close with tubing clamp.

e) Check pressure drop. The pressure drop must be < 50 mmHg ín 30 s.

Leak Test Heat Exchanger (WT)

a) Rinse water circuit to prevent air bubbles.

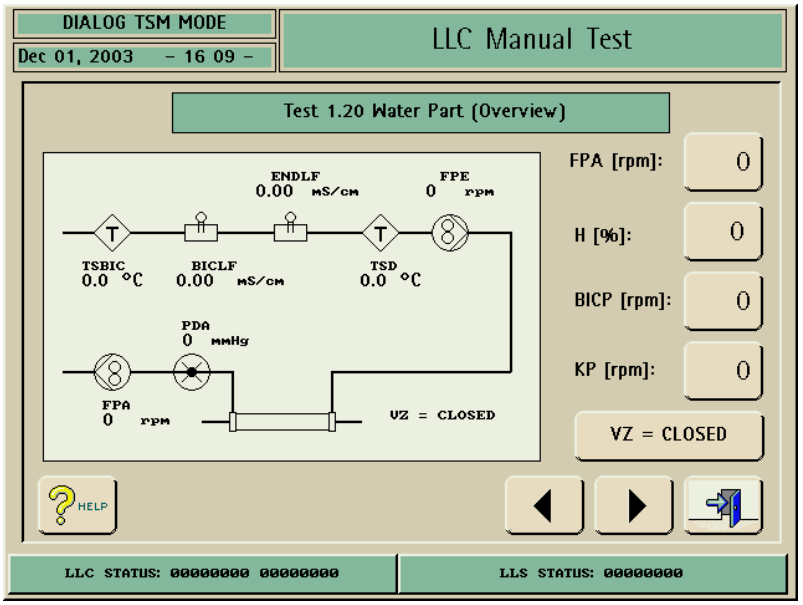
b) Close the outlet.

c) Activate test.

The **FPE** builds up a pressure.

d) Check pressure drop. The pressure drop must be < 50 mmHg ín 30 s.

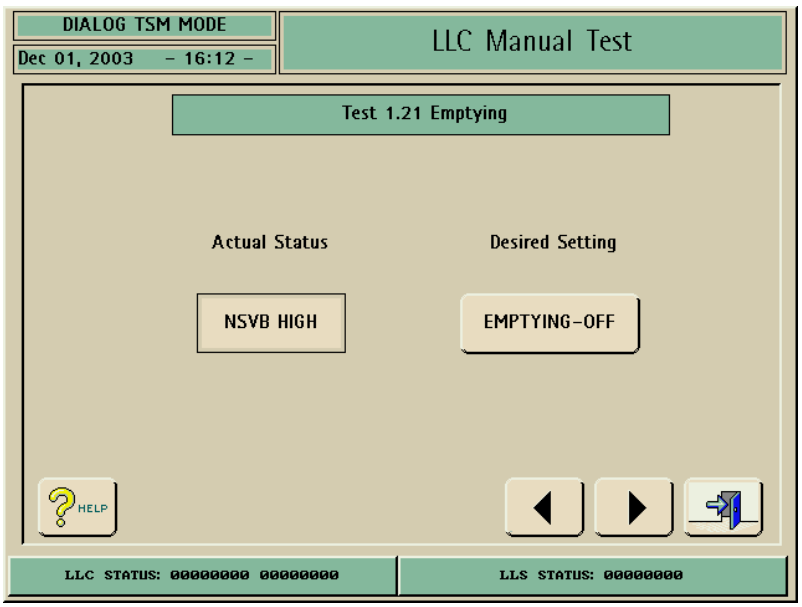
4.10.2.20 Test 1.20 Water Part (Overview)



1. Activate the *Water Part (Overview)* menu with the *Water Part (Overview)* key in the *LLC Manual Test* menu. The following menu is displayed.
2. Check the functions with the appropriate keys.
3. Press the or key to skip to the previous or to the next test point.

You can set the speed for the flow pump **FPE/FPA**. The heater power **H %** can be set in %. The speed of the concentrate pumps **BICP/KP** can be set manually. After starting this menu the balance chamber is intialised. Then the flow pump **FPE** is set to the same speed as **FPA**. The balance chamber valves are switched automatically.

4.10.2.21 Test 1.21 Emptying



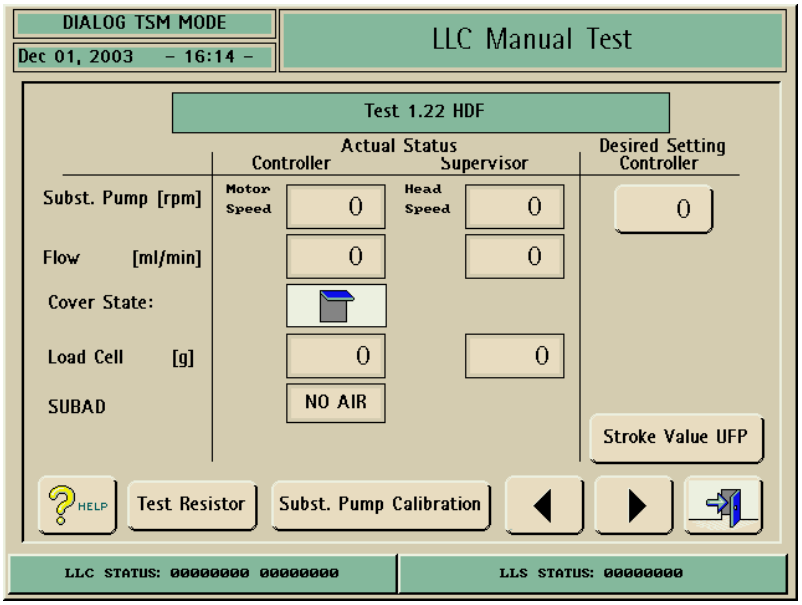
1. Activate the *Emptying* menu with the *Emptying* key in the *LLC Manual Test* menu. The following menu is displayed.
2. Check the functions with the appropriate keys.
3. Press the or key to skip to the previous or to the next test point.

You can drain the system. After the emptying key is activated the drain procedure is started. The actual value, i.e. the fluid level of the upline tank **VB** is displayed by the level sensors **NSVB**.

Start the *Emptying ON* at least three times and manually clamp the bypass (tubing) to ensure a complete emptying.

4.10.2.22 Test 1.22 HDF

A max. of 20 kg can be loaded on the HDF arm. This guarantees a safe tilt stability of the Dialog (see operating instructions)!



1. Activate the *HDF* menu with the *HDF* key in the *LLC Manual Test* menu. The following menu is displayed.
2. Check the functions with the appropriate keys.
3. Press the ◀ or ▶ key to skip to the previous or to the next test point.
4. Hang the calibration weight on the load cell and check the *Load Cell* display (± 50 g).
5. Check substitution air detector **SUBAD**) for *AIR* and *NO AIR*.

   NO AIR
   - Insert the substitution line (segment filled with water) into the **SUBAD** and check: Close **SUBAD** cover: *NO AIR*

   AIR
   - Insert substitution line (segment with air) into the **SUBAD** and check: Close **SUBAD** cover: *AIR*

You can test the substitution delivery and the components by connecting a substitution line. The substitution pump **BPV** works with the selected speed (conversion factor between motor speed and head speed: 46.615).

The load cell can be checked after calibration with a calibration weight.

The pump is stopped if the pump cover (cover sensor) is opened.

The flow and the weight loss on the load cell can be checked by using a graduated cylinder.

The substitution air detector **SUBAD** can be checked.

Calibration weight (10 kg)
Substitution Line

6. Open pump cover. Pump stops and opened pump cover symbol is displayed.
7. Insert new pump segment of a new substitution line. Enter the following speeds and check in the display:

   1500 min^{-1} and 120 min^{-1}

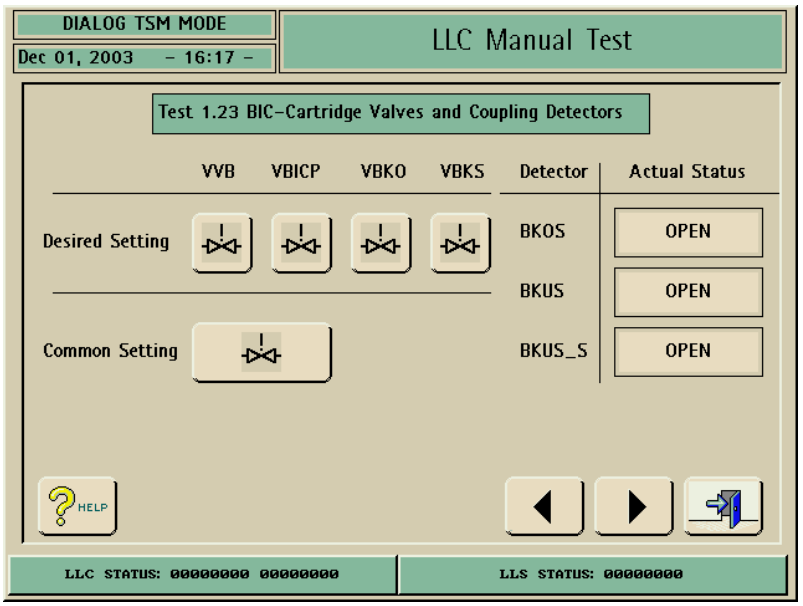
   The speed value ranges are listed in the table.

   Enter 1500 min^{-1} and wait until a stable value is displayed.

   Enter 120 min^{-1} and wait until a stable value is displayed.

Speed	Actual Satutus Controller (Motor Speed)	Actual Satutus Supervisor (Head Speed)
1500	975 - 2025	24 - 51
120	78 - 162	2 - 4

4.10.2.23 1.23 BIC Cartridge Valves and Coupling Detectors



1. Activate the *BIC Cartridge Valves and Coupling Detectors* menu with the *BIC Cartridge Valves and Coupling Detectors* key in the *LLC Manual Test* menu. The following menu is displayed.
2. Check the functions with the appropriate keys.
3. Press the or key to skip to the previous or to the next test point.

Valves

VVB, VBICP, VBKO, VBKS
The valves **VVB**, **VBICP**, **VBKO** and **VBKS** can be switched either separately or together.

Detectors

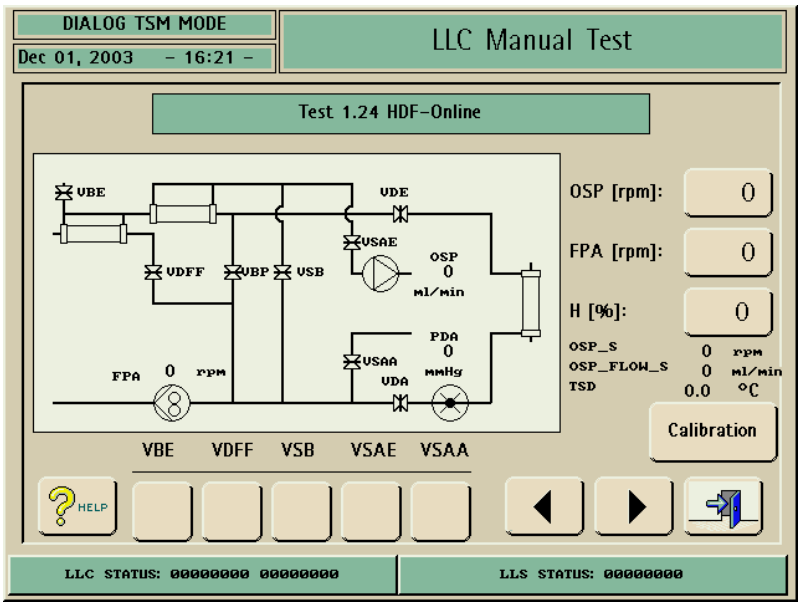
BKOS
BIC Cartridge Holder with Nonreturn Valve:
A reed sensor is not present.

BIC Cartridge Holder without Valve:
The status of the reed sensor (*OPEN/CLOSED*) is displayed.

BKUS, BKUS_S
The status of the reed sensor (*OPEN/CLOSED*) is displayed.

4.10.2.24 1.24 HDF Online

Exchange Intervals:
The HFB filter must be exchanged in one year intervals!



1. Activate the *HDF Online* menu with the *HDF Online* key in the *LLC Manual Test* menu. The following menu is displayed.
2. Check the functions with the appropriate keys.
3. Press the ◀ or ▶ key to skip to the previous or to the next test point.

You can check the function of the HDF online substitution pump *OSP (BPV)* and the additional valves.

Online Substitution Pump OSP (BPV)

The function of the HDF online substitution pump *OSP (BPV)* can be checked.

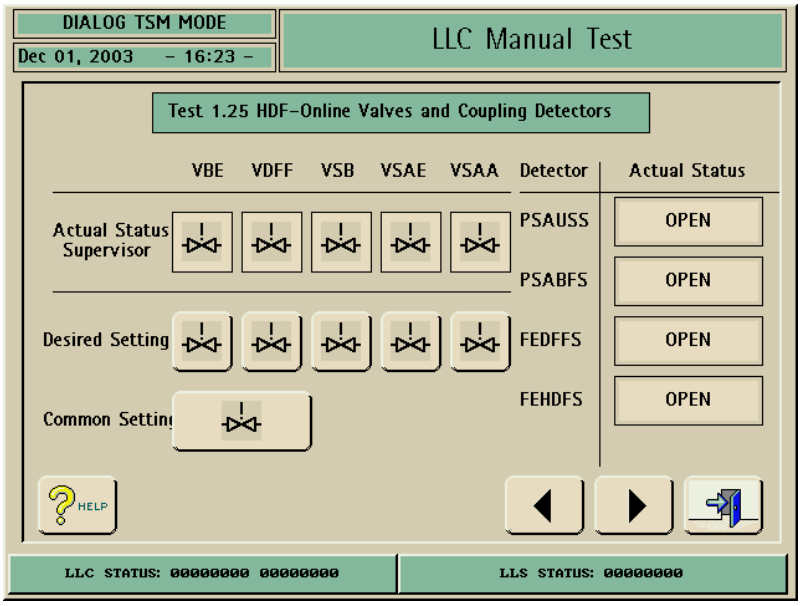
Valves

VBE, *VDFF*, *VSB*, *VSAE*, *VSAA*
The flow path through both filters (**DF** and **HDF**) can be set via the valves.
Before operation in main flow the DF filter inlet must be vented via **VDFF**, because the membranes of the **DF** filter and **HDF** filter are impermeable to air.

Valve **VBE** can only be opened if **PDA** < -100 mmHg to prevent fluid penetration.

Start the *Emptying ON* at least three times and manually clamp the bypass (tubing) to ensure a complete emptying.

4.10.2.25 1.25 HDF Online Valves and Coupling Detectors



1. Activate the *HDF Online Valves and Coupling Detectors* menu with the *HDF Online Valves and Coupling Detectors* key in the *LLC Manual Test* menu. The following menu is displayed.
2. Check the functions with the appropriate keys.
3. Press the or key to skip to the previous or to the next test point.

You can activate and deactivate the HDF online valves.

Valves

VBE, *VDFF*, *VSB*, *VSAE*, *VSAA*
You can either activate or deactivate a single valve with the *Desired Setting* icon or all valves *VBE*, *VDFF*, *VSB*, *VSAE*, *VSAA* with the *Common Setting* icon. Thus the feedback from the LLS can be checked.

Detectors

PSAUSS (substitution port outlet sensor)
The status of the additional coupling sensor *PSAUS* can be checked.

PSABFS (substitution port drain sensor)
The status of the additional coupling sensor *PSABFS* can be checked.

FEDFFS (filter recognition DF filter)
The status of the additional coupling sensor *FEDFFS* can be checked.

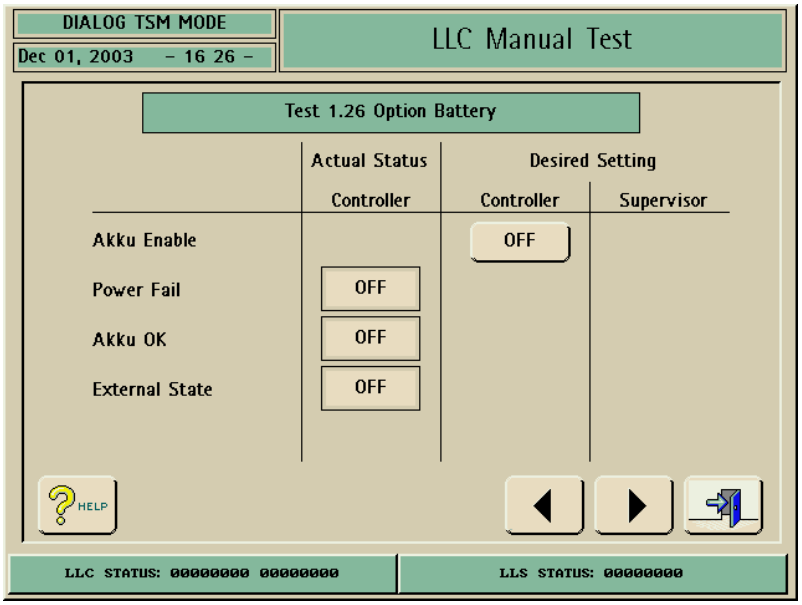
FEHDFS (filter recognition HDF filter)
The status of the additional coupling sensor *FEHDFS* can be checked.

4.10.2.26 1.26 Option Rechargeable Battery

Charge Batteries

To guarantee battery operation the batteries may have to be charged for several hours if the Dialog was not connected to mains for a longer period.

If the batteries are empty the charge time is > 8 hours to guarantee a battery running time of at least 20 minutes.



1. Activate the *Option (Rechargeable) Battery* menu with the *Option (Rechargeable) Battery* key in the *LLC Manual Test* menu. The following menu is displayed.
2. Check the functions with the appropriate keys.
3. Press the ◀ or ▶ key to skip to the previous or to the next test point.

The enable parameter can be set and the following parameters can be checked:

Setting

- *Akku Enable* (battery enable, *AKKU_EN* signal)

Check

- *Power Fail* (PF signal)
- *Akku OK* (battery OK, *AKKU_OK* signal)
- *External State* (*EXT_STATE* signal)

Akku Enable (Battery Enable)

The enable signal is set to ON by the LLC in therapy. Thus indicating to the power supply that the battery operation can be enabled in the case of a power breakdown. In all other operating modes (with the exception of therapy) the *Akku Enable* (battery enable, AKKU_EN signal) is set to OFF, i.e. the machine is switched off in case of a power breakdown.

1. Battery loaded (charge LED off), i.e. *Akku OK* (battery OK) = *ON*
2. Set *Akku Enable* (battery enable) to *ON*.
3. Disconnect machine from mains with mains plug.

An audible signal is activated from the power supply, which indicates that the machine is running in battery operation.

- Blood pump(s) run(s)
- Monitor is on
- Power Fail = *ON*
- *Akku OK* (battery OK) changes from *ON* to *OFF*

Power Fail

The switch mode power supply sends the signal to the LLC indicating a power failure.

OFF	Mains voltage present (and in the tolerance limits)
ON	Mains voltage not present (or out of tolerance limits)

Akku OK (Battery OK)

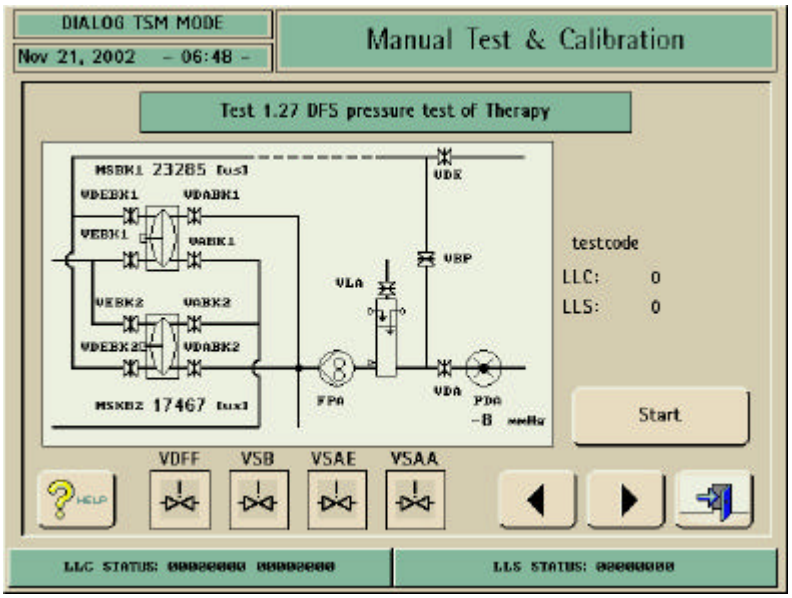
ON	Battery capacity ≥ required capacity for 20 minutes battery running time
OFF	Battery capacity < required capacity for 20 minutes battery running time

External State

Indicates if machine was switched on externally.

ON	Machine was switched on externally

4.10.2.27 1.27 DFS Pressure Test of Therapy



1. Activate the *DFS Pressure Test of Therapy* menu with the *DFS Pressure Test of Therapy* key in the *LLC Manual Test* menu. The following menu is displayed.
2. Check the functions with the appropriate keys.
3. Press the key to skip to the previous test point or press the key to automatically skip to the first test point.

Start Button	You can activate the DFS pressure test with the *Start* button from the selftest in *Preparation*.
Stop Button	The test run can be terminated with the *Stop* button. The button jumps back to *Start* in case of an error or at the end of the pressure test.
Test Code	The test codes for LLC and LLS are displayed for all test phases. In case of an error the defective components can be determined with the help of the test description.

4.10.3 General Information Calibration

Measurement instruments (e.g. dialysis measurement instrument) used to calibrate Dialog machines are subject to regular inspections or if necessary calibration by the acc. manufacturer or by a certified calibration lab.

Various keys (software keys and hardware keys) are used during calibration. The function and significance of the keys are as follows.

Hardware Keys

The hardware keys are on the keyboard membrane of the colour monitor (see figure).

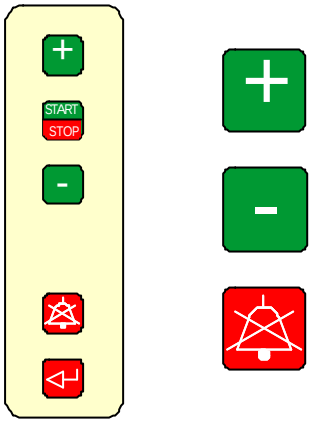


Fig. : Keyboard Membrane

Input values can be increased in increments with the displayed hardware key as an alternative to the software key on the touch screen.

Input values can be decreased in increments with the displayed hardware key as an alternative to the software key on the touch screen.

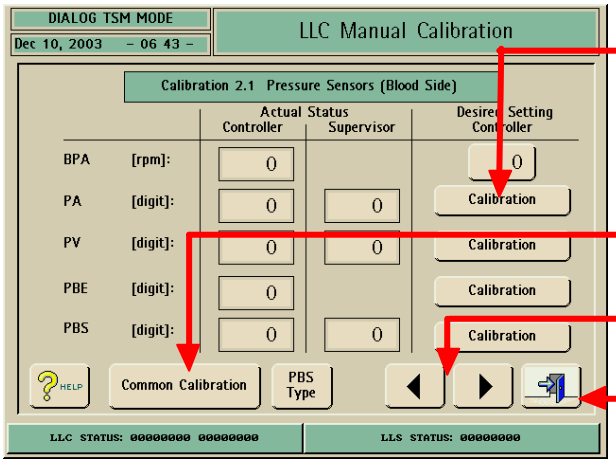
The service overview can be selected in the TSM with the hardware key.

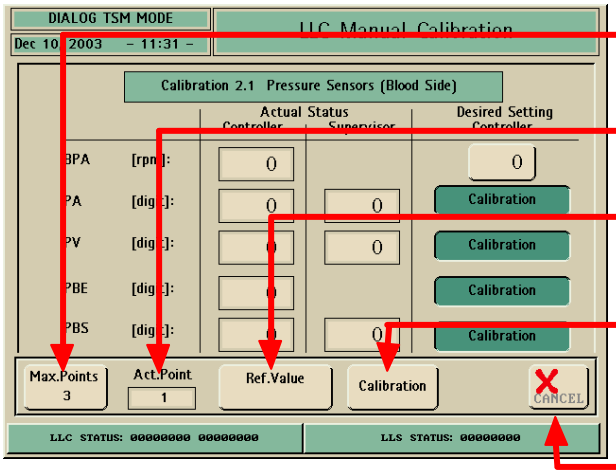
Note

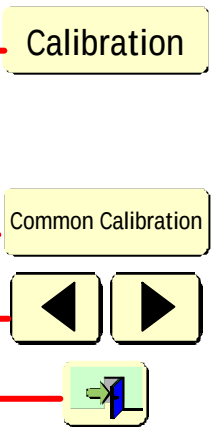
SW ³ 3.46 **SW < 3.46** AQ

Software Keys

The software keys are displayed in the respective menus of the TSM service program and can be operated via the touch screen.





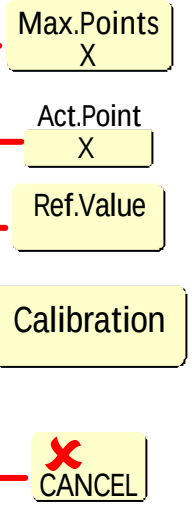


A single sensor is selected for calibration with the software key and a lower calibration window is opened.

A combined sensor calibration can be selected with the software key and a lower calibration window is opened.

The previous calibration menu or the next calibration menu can be selected with the software keys.

Exit the menu with the door key.



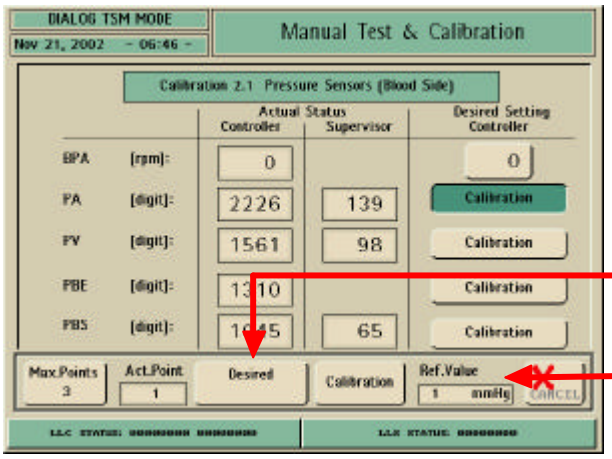
The number of calibration steps is displayed or can be modified.

The current calibration step is displayed.

The input window is opened to enter a reference value. It should always be close to the proposed reference value.

The calibration for the respective current calibration point is started.

A calibration can be terminated. The procedure is not saved.



Dialog software version ≥ 6.20: a dialysis measurement instrument (e.g. HDM ≥ 99 with a software version ≥ 3.52) can be connected to the Dialog to calibrate the pressure, the temperature and the conductivity. The HDM is connected to the RS 232 interface of the motherboard.

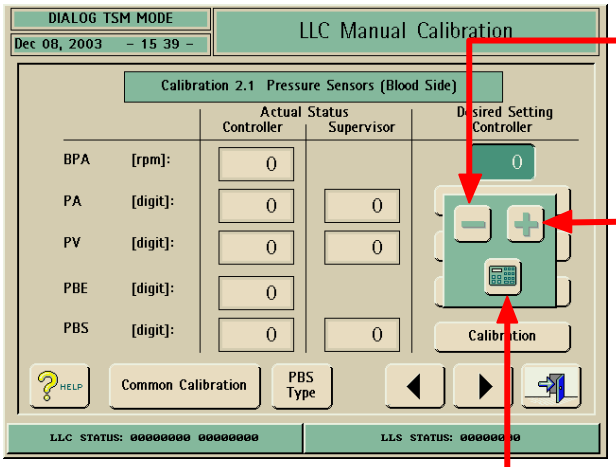
Desired Value

The desired value of the machine is displayed.

Ref.Value

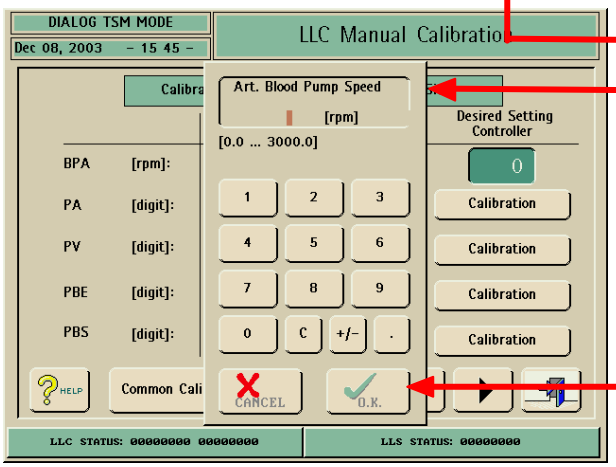
X

If a dialysis measurement instrument (HDM) is connected the referenz value window appears. The reference value of the dialysis measurement instrument is displayed.



Input values can be increased in increments with the displayed software key as an alternative to the hardware key on the keyboard membrane of the colour monitor.

Input values can be decreased in increments with the displayed software key as an alternative to the hardware key on the keyboard membrane of the colour monitor.



The calculator symbol opens a numeric software keyboard. You can enter values with this keyboard. The entered value must be in the permissible limits (e.g. 0 to 3000, see figure).

An input can be acknowledged, e.g. a reference value or a completed calibration procedure can be acknowledged and saved.

Terminate Calibration Procedure

CANCEL

A calibration procedure can be terminated at any time with the *CANCEL* key. The existing calibration data are maintained in the LLS and LLC.

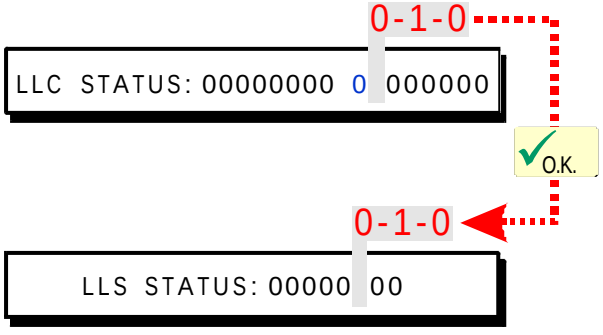
Save Calibration Procedure

O.K.

The calibration procedure is completed and the new calibration data is stored in the LLC and LLS with the *OK* key.

Note

Pay attention to the LLC and LLS status windows. The bit sequence 0 - 1 - 0 must be identical in the LLC and LLS status windows during the saving procedure. The calibration data is saved only after the bit sequence 0 - 1 - 0 (see figure).
You should save the calibration data to the hard disk drive before you exit the TSM service program: *TSM Main Menu*, *File Operations*, *Save Calibration Data*.

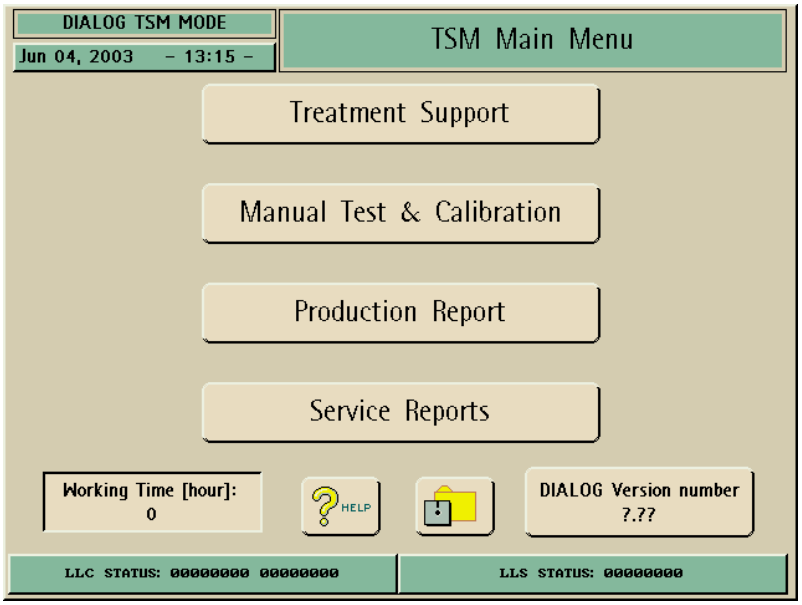


Conversion Table Voltage/Digits

	Controller (12 bit)	Supervisor (8 bit)
Voltage	0 to 5 V	0 to 5 V
Digits	0 to 4095	0 to 255

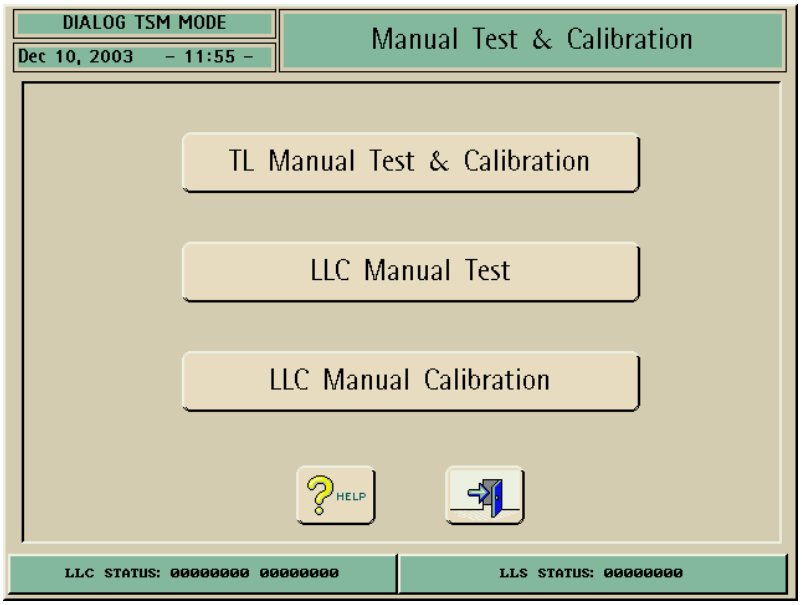
4.10.4 Low Level Calibration

You can calibrate all sensors in the *LLC Manual Calibration* menu. The number of calibration points is preset but can be changed manually if a higher accuracy /linearity is wanted.

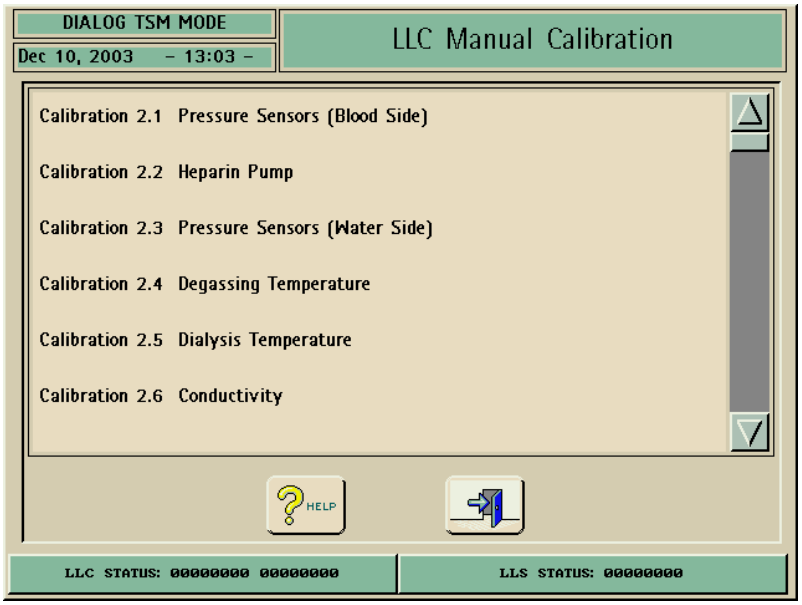


Some sensors have the possibility to run a combined or a single calibration.

The *TSM Main Menu* is diplayed after the machine is switched on (service switch in position 2).



1. Activate the *Manual Test & Calibration* menu with the *Manual Test & Calibration* key in the *TSM Main Menu*. The following menu is displayed.



2. Activate the *LLC Manual Calibration* menu with the *LLC Manual Calibration* key in the *Manual Test and Calibration* menu. The following menu is displayed.

The following low level calibrations can be selected:

- 2.1 Pressure sensors (blood side)
- 2.2 Heparin pump
- 2.3 Pressure sensors (water side)
- 2.4 Degassing temperature
- 2.5 Dialysis temperature
- 2.6 Conductivity
- 2.7 Blood leak detector
- 2.8 Flow of BICP, KP and UF pump
- 2.9 Safety air detector SAD
- 2.10 BICLF ratio and ENDLF ratio
- 2.11 Load cell
- 2.12 PV alarm window
- 2.13 Flow rate of BPA and BPV
- 2.14 Substitution pump
- 2.15 HDF online substitution pump OSP

4.10.4.1 Calibration Pressure Sensors Blood Side PA, PV, PBE and PBS

Prior to Calibration

- Use calibrated dialysis measurement instrument
- Wait until Dialog has reached working temperature

You can calibrate the following pressure sensors of the blood side either separately or combined:

- **PA** arterial pressure sensor
- **PV** venous pressure sensor
- **PBE** blood inlet pressure sensor
- **PBS** blood control pressure sensor

If the pressure sensor **PBS** is present the sensor is activated with the *PBS* icon.
After a calibration compare the pressure sensor values.
The sensor values are displayed in digits (see conversion table).

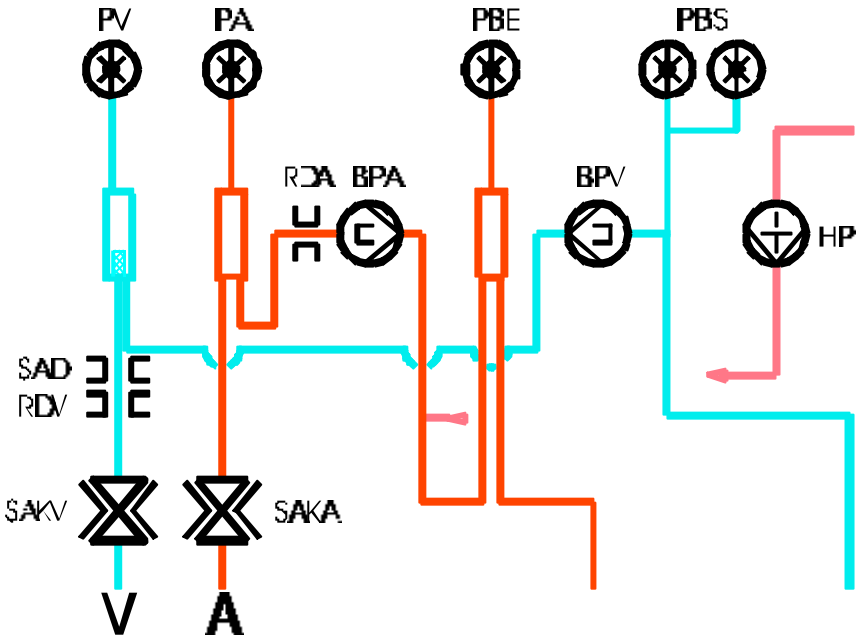
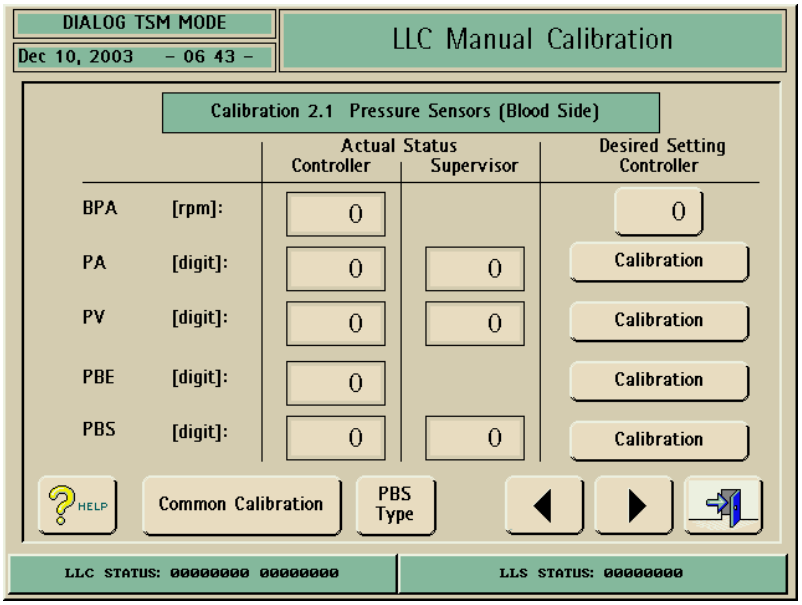
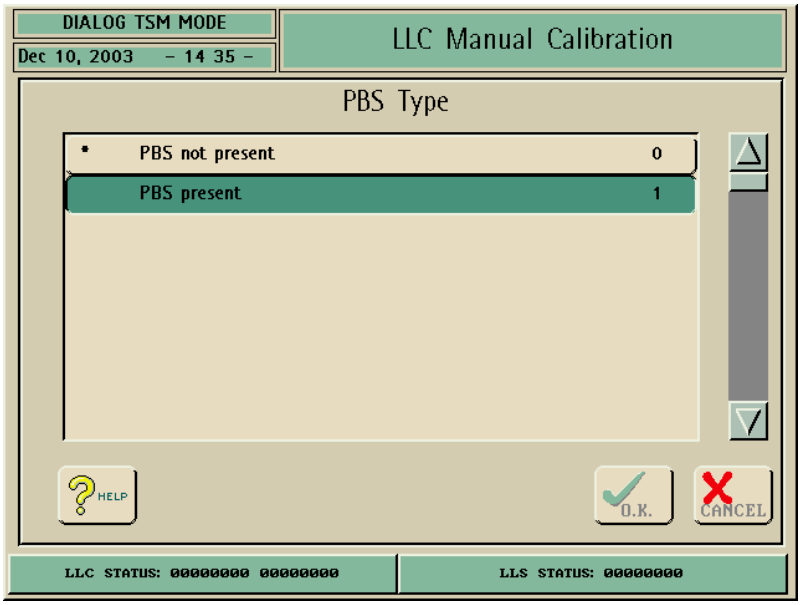


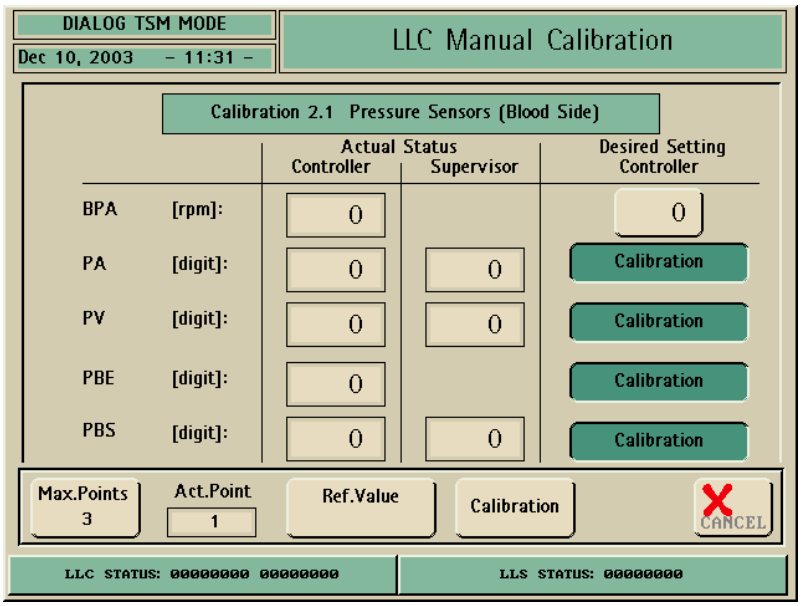
Fig. : Single Needle Version



1. Activate the LLC Manual Calibration menu with the *LLC Manual Calibration* key in the *Manual Test and Calibration* menu.
2. Activate the *Pressure Sensors Blood Side* menu by pressing on the line *Calibration 2.1 Pressure Sensors Blood Side*. The following menu is displayed.
3. Press the ◀ or ▶ key to skip to the previous or to the next calibration menu.



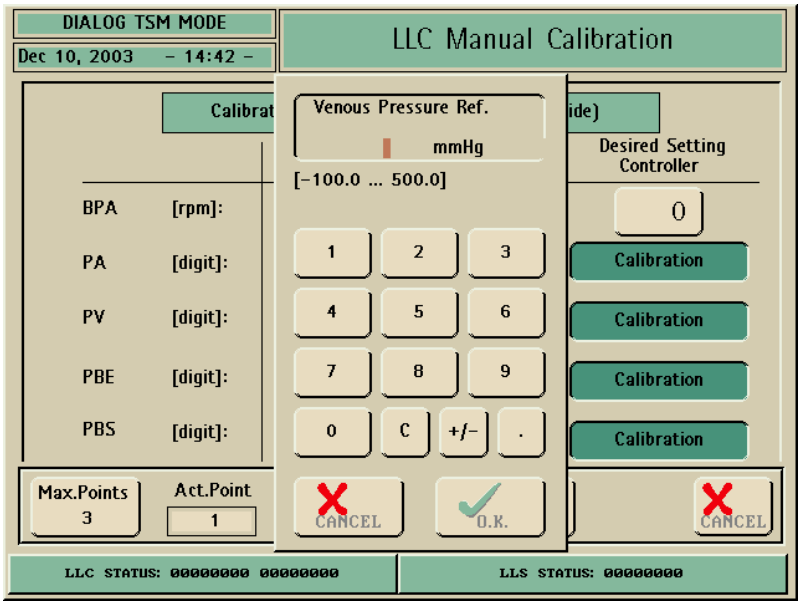
Open the *PBS Type* menu with the *PBS Type* key. If the pressure sensor **PBS** is present activate with *PBS Present* (Dialog with two blood pumps).



Press the Common Calibration key for a combined calibration (-100 mmHg, 0 mmHg, +500 mmHg) of the pressure sensors **PA**, **PV**, **PBE** and **PBS**. A calibration window is opened if the key is selected.

Note

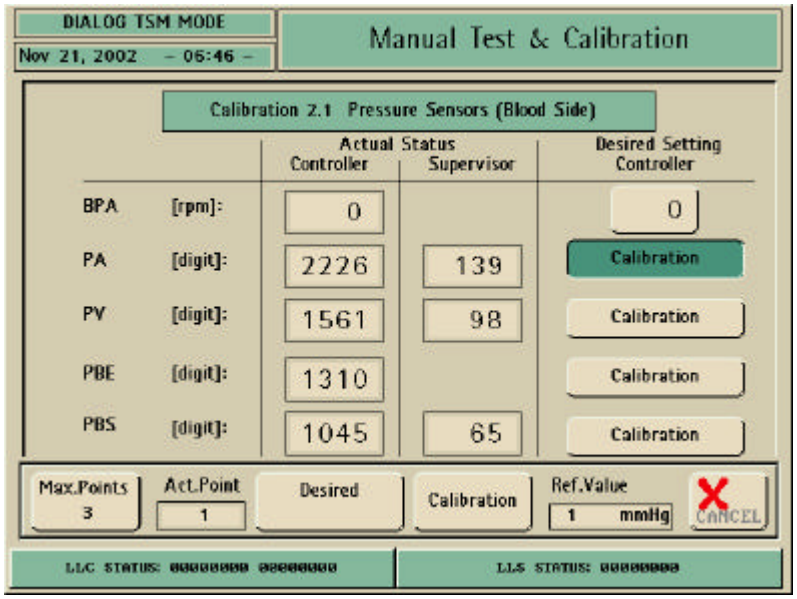
PA must be calibrated again after the common calibration, because **PA** has a different working range and thus different calibration points (-300 mmHg, 0 mmHg, +300 mmHg).



Press the Ref.Value key to enter a reference value. An enter window is opened if the key is selected.

4.10.4.1.1 Single Calibration Pressure Sensor PA via RS-232

Dialysis measurement instrument connected to RS 232 interface (SW ≥ 6.20).



A dialysis measurement instrument (HDM ≥ 99 with a software version ≥ 3.52) can be connected to the RS 232 interface for calibration.

Press the Calibration key for a single calibration, e.g. pressure sensor **PA**. A calibration window is opened if the key is selected.

- Dialysis measurement instrument (e.g. HDM 99) and DCI option (art. no. 770 7218) or a D-Sub zero modem cable
- Syringe
- Tubing/tubing clamp

1. Connect dialysis measurement instrument to the RS 232 interface and switch on machine, connect syringe and tubing.
2. Connect tubing end to the arterial pressure sensor **PA**.
3. Press *PA* Calibration key.

PA Calibration Point -300 mmHg

4. Build up a pressure to -300 mmHg (± 10 mmHg) with a syringe and clamp the tube.
5. Compare the stable reference value in the Ref.Value X window with the desired value in the Desired Value window and acknowledge with the Calibration key.
   - The reference value is taken over in the Desired Value window.
   - The next calibration point is displayed in the Act.Point X window.

PA Calibration Point 0 mmHg

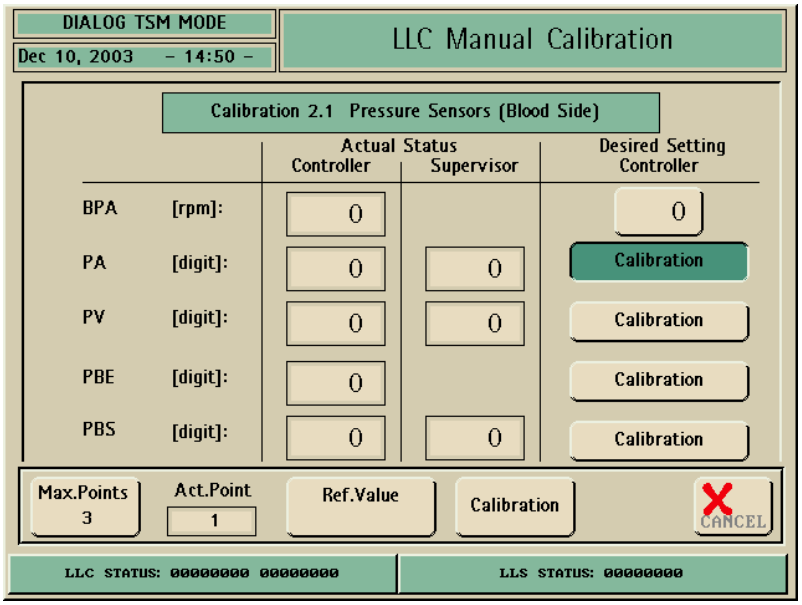
6. Remove syringe 0 mmHg.
7. Compare the stable reference value in the Ref.Value X window with the desired value in the Desired Value window and acknowledge with the Calibration key.
   - The reference value is taken over in the Desired Value window.
   - The next calibration point is displayed in the Act.Point X window.

PA Calibration Point +300 mmHg

8. Connect syringe and Build up a pressure to +300 mmHg (± 10 mmHg) and clamp the tube.
9. Compare the stable reference value in the Ref.Value X window with the desired value in the Desired Value window and acknowledge with the Calibration key.
   - The reference value is taken over in the Desired Value window.
10. Acknowledge and store completed calibration with the O.K. key.
11. Remove dialysis measurement instrument, syringe and tubing.

4.10.4.1.2 Single Calibration Pressure Sensor PA

Without automatic acceptance of the reference value (SW < 6.20).



Press the Calibration key for a single calibration, e.g. pressure sensor **PA**. A calibration window is opened if the key is selected.

- Dialysis measurement instrument (e.g. HDM 99)
- Syringe
- Tubing/tubing clamp

1. Connect dialysis measurement instrument, syringe and tubing.
2. Connect tubing end to the arterial pressure sensor **PA**.
3. Press *PA* Calibration key.

PA Calibration Point -300 mmHg

4. Build up a pressure to -300 mmHg (± 10 mmHg) with a syringe and clamp the tube.
5. Press Ref.Value key.
6. Enter the stable value from the dialysis measurement instrument as reference value.
7. Acknowledge with the Calibration key.

PA Calibration Point 0 mmHg

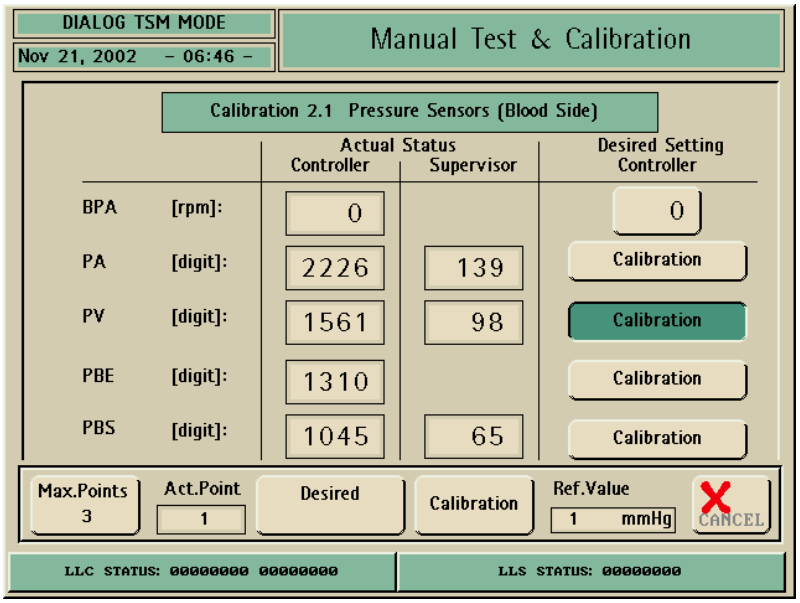
8. Remove syringe 0 mmHg.
9. Acknowledge the reference value 0 mmHg with the Calibration key.

PA Calibration Point +300 mmHg

10. Connect syringe and Build up a pressure to + 300 mmHg (± 10 mmHg) and clamp the tube.
11. Press Ref.Value key.
12. Enter the stable value from the dialysis measurement instrument as reference value.
13. Acknowledge with the Calibration key.
14. Acknowledge and store completed calibration with O.K. key.
15. Remove dialysis measurement instrument, syringe and tubing.

4.10.4.1.3 Single Calibration Pressure Sensors PV, PBE and PBS via RS-232

Dialysis measurement instrument connected to RS 232 interface (SW ≥ 6.20).



A dialysis measurement instrument (HDM ≥ 99 with a software version ≥ 3.52) can be connected to the RS 232 interface for calibration.

Press the Calibration key for a single calibration of the pressure sensor **PV, PBE** or **PBS**. A calibration window is opened if the key is selected.

- Dialysis measurement instrument (e.g. HDM 99) and DCI option (art. no. 770 7218) or a D-Sub zero modem cable
- Syringe
- Tubing/tubing clamp

1. Connect dialysis measurement instrument to the RS 232 interface and switch on machine, connect syringe and tubing.
2. Connect the tubing to the respective pressure sensor **PV**, **PBE** or **PBS**.
3. Press *PV*, *PBE* or *PBS* Calibration key.

PV/PBE/PBS Calibration Point -100 mmHg

4. Build up a pressure to -100 mmHg (± 10 mmHg) with a syringe and clamp the tube.
5. Compare the stable reference value in the Ref.Value X window with the desired value in the Desired Value window and acknowledge with the Calibration key.
   - The reference value is taken over in the Desired Value window.
   - The next calibration point is displayed in the Act.Point X window.

PV/PBE/PBS Calibration Point 0 mmHg

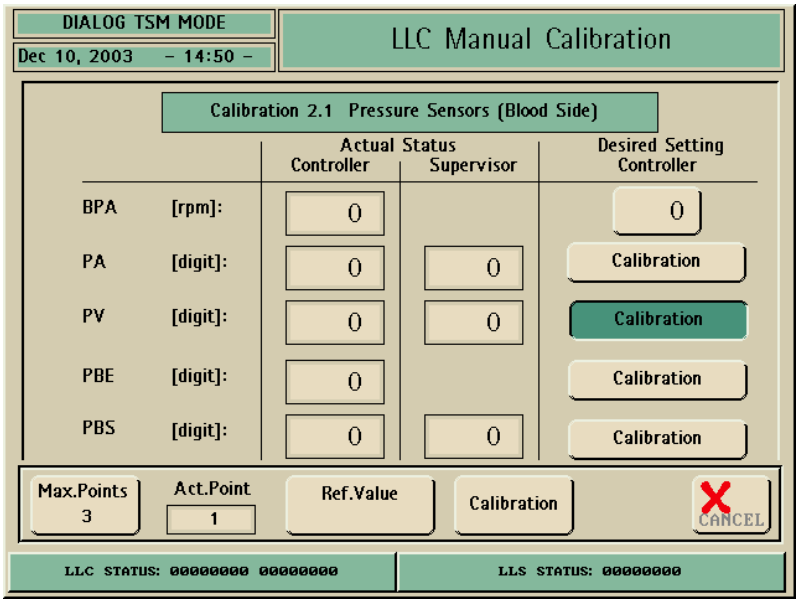
6. Remove syringe 0 mmHg.
7. Compare the stable reference value in the Ref.Value X window with the desired value in the Desired Value window and acknowledge with the Calibration key.
   - The reference value is taken over in the Desired Value window.
   - The next calibration point is displayed in the Act.Point X window.

PV/PBE/PBS Calibration Point +500 mmHg

8. Connect syringe and Build up a pressure to +500 mmHg (± 10 mmHg) and clamp the tube.
9. Compare the stable reference value in the Ref.Value X window with the desired value in the Desired Value window and acknowledge with the Calibration key.
   - The reference value is taken over in the Desired Value window.
10. Acknowledge and store completed calibration with O.K. key.
11. Remove dialysis measurement instrument, syringe and tubing.

4.10.4.1.4 Single Calibration Pressure Sensors PV, PBE and PBS

Without automatic acceptance of the reference value (SW < 6.20).



Press the Calibration key for a single calibration of the pressure sensor **PV, PBE** or **PBS**. A calibration window is opened if the key is selected.

- Dialysis measurement instrument (e.g. HDM 99)
- Syringe
- Tubing/tubing clamp

1. Connect dialysis measurement instrument, syring and tube.
2. Connect the tubing to the respective pressure sensor **PV**, **PBE** or **PBS**.
3. Press *PV*, *PBE* or *PBS* Calibration key.

PV/PBE/PBS Calibration Point -100 mmHg

4. Build up a pressure to -100 mmHg (± 10 mmHg) with a syringe and clamp the tube.
5. Press Ref.Value key.
6. Enter the stable value from the dialysis measurement instrument as reference value.
7. Acknowledge with the Calibration key.

PV/PBE/PBS Calibration Point 0 mmHg

8. Remove syringe 0 mmHg.
9. Acknowledge the reference value 0 mmHg with the Calibration key.

PV/PBE/PBS Calibration Point +500 mmHg

10. Connect syringe and Build up a pressure to +500 mmHg (± 10 mmHg) and clamp the tube.
11. Press Ref.Value key.
12. Enter the stable value from the dialysis measurement instrument as reference value.
13. Acknowledge with the Calibration key.
14. Acknowledge and store completed calibration with O.K. key.
15. Remove dialysis measurement instrument, syringe and tubing.

4.10.4.1.5 Common Calibration Pressure Sensors PA, PV, PBE and PBS

PA must be calibrated again after the common calibration, because the calibration range for **PA** are different.

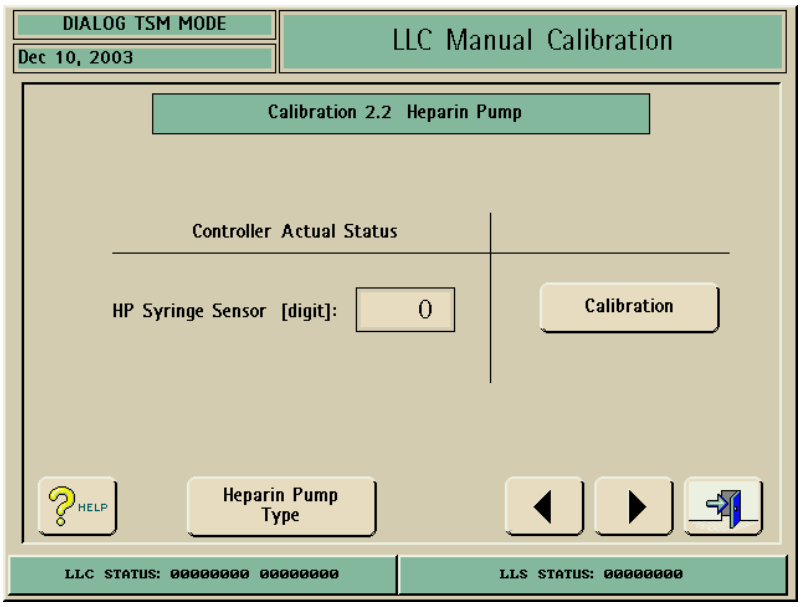
- Dialysis measurement instrument (e.g. HDM 99)
- Syringe
- Tubing/tubing clamp

1. Connect the dialysis measurement instrument, syringe and tubing set.
2. Connect the end of the tubing to pressure sensors **PA, PV**, **PBE**, **PBS** (option).
3. Press Common Calibration key.
4. Perform a combined calibration (see the description of the single calibration).
   - Calibration point-100 mmHg
   - Calibration point 0 mmHg
   - Calibration point+500 mmHg
5. Calibrate the PA sensor once more.

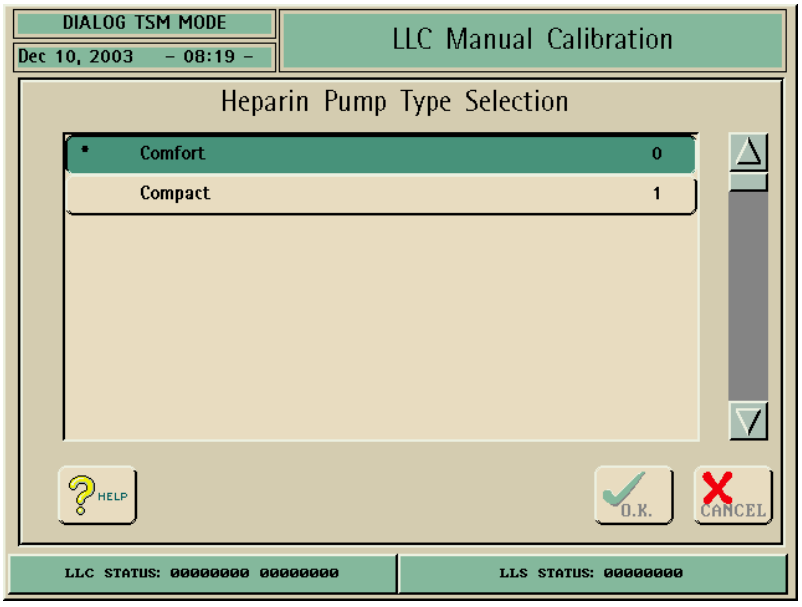
4.10.4.2 Heparin Pump

Heparin Pump Comfort

The syringe sensor for the heparin pump Comfort can be calibrated with templates. Thereby the various syringe diameters are detected and the syringe seizes are recognized. The values are displayed in digits.



1. Activate the *LLC Manual Calibration* menu with the *LLC Manual Calibration* key in the *Manual Test and Calibration* menu.
2. Activate the *Heparin Pump* menu by pressing on the line *Calibration 2.2 Heparin Pump*. The following menu is displayed.
3. Press the ◀ or ▶ key to skip to the previous or to the next calibration menu.



Heaprin Pump Type/Heparin Pump Type Selection

Comfort 0 must be activated (see figure) if a heparin pump Comfort is present in the machine.

If present you can skip from menu *Low Level Test, 1.4 Heparin Pump* to the menu *Calibration 2.2 Heparin Pump* with the Calibration key.

Compact 1 must be activated if a heparin pump Compact is present in the machine. Then a calibration of the syringe diameter is not necessary, i.e. you can not skip to the menu *Calibration 2.2 Heparin Pump* from the menu *Low Level Test, 1.4 Heparin Pump*.

- Potentiometer template 20 ml (770 1543)
- Potentiometer template 50 ml (770 1551)

1. Press Calibration key.
2. Insert the 20 ml template into the heparin pump Comfort and close syringe holder.
3. Acknowledge with Calibration key.
4. Insert the 50 ml template into the heparin pump Comfort and close syringe holder.
5. Acknowledge with Calibration key.
6. Acknowledge and store complete calibration procedure with O.K. key.

4.10.4.3 Calibration Pressure Sensors of Water Side PE and PDA

Prior to Calibration

- Use calibrated dialysis measurement instrument
- Wait until Dialog has reached working temperature

You can calibrate the degassing pressure sensor **PE** and the outlet dialysate fluid pressure sensor **PDA**. You can build up a negative pressure in the degassing circuit with the degassing pump **EP** and the degassing control valve **RVE** for calibration . If you open the air separator valve **VLA** the degassing line is opened to PDA. Thereby **PDA** can also be calibrated. Please pay attenion to the level difference and whether fluid is in the connection line between the degassing circuit and **VLA**. The following pressure sensors can be calibrated:

- **PE** degassing pressure sensor
- **PDA** outlet diaylsate fluid pressure sensor

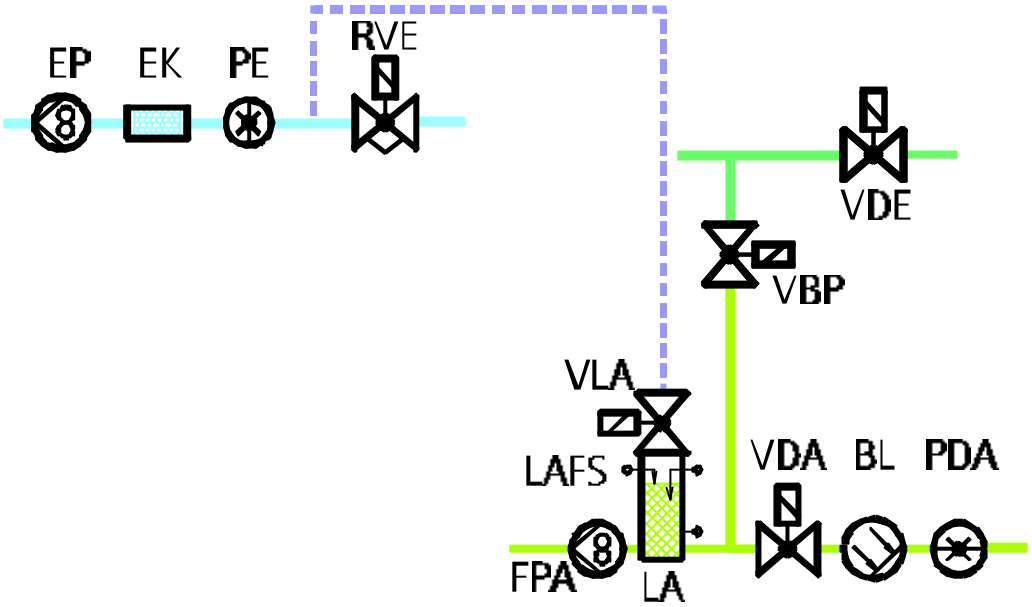
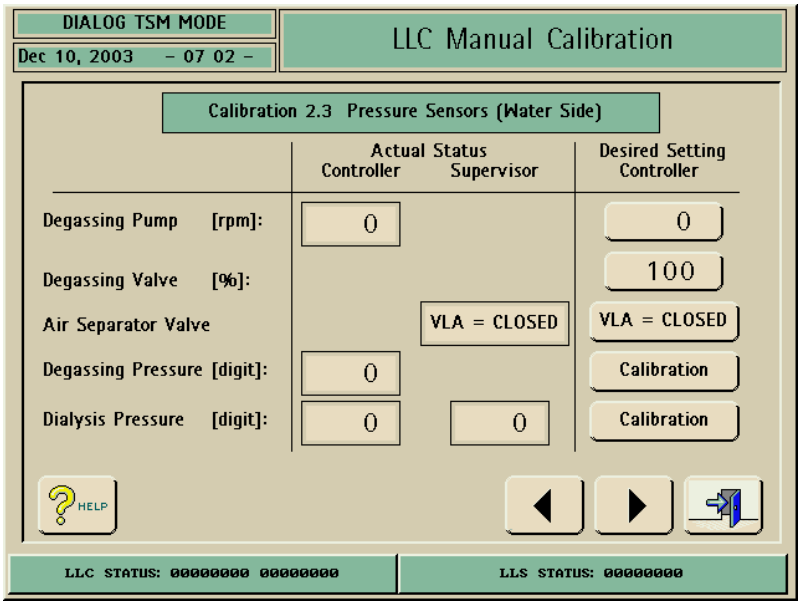


Fig.: Degassing Circuit and PDA

The dialyser tubings must be free of air for the calibration. Please ensure that the dialysis measurement instrument and connection tubing are at the same level as the rinsing bridge.



1. Activate the *LLC Manual Calibration* menu with the *LLC Manual Calibration* key in the *Manual Test and Calibration* menu.
2. Activate the *Pressure Sensors Water Side* menu by pressing on the line *Calibration 2.3 Pressure Sensors Water Side*. The following menu is displayed.
3. Press the ◀ or ▶ key to skip to the previous or to the next calibration menu.

4.10.4.3.1 Calibration Pressure Sensor Degassing PE

The calibration with the automatic acceptance of the reference values from the HDM 99 (or a similar unit) is performed according to the description of the pressure sensors for the blood side.

A pressure difference can be present between the dialysis measurement instrument and the pressure sensor **PE** (tolerance of pressure sensor PE ± 50 mmHg).
The pressure difference can occur if the connection line from the air separation valve **VLA** to the degassing chamber is filled with liquid (20 cm approx. 15 mmHg).

- Dialysis measurement instrument (e.g. HDM 99)

1. Connect dialysis measurement instrument between dialyser couplings.
2. Set degassing control valve **RVE** to 50 %.
3. Open air separator valve with the VLA CLOSED key. The key switches to VLA OPEN.

PE Calibration Point -400 mmHg

4. Press *PE* Calibration key.
5. Slowly increase the speed of the degassing pump **EP**, until a negative pressure of -400 mmHg (± 10 mmHg) is displayed at the dialysis measurement instrument.
6. Press Ref.Value key.
7. Enter the stable value from the dialysis measurement instrument as reference value.
8. Acknowledge with Calibration key.

PE Calibration Point -100 mmHg

9. Slowly reduce the speed of the degassing pump **EP**, until a negative pressure of -100 mmHg (± 10 mmHg) is displayed at the dialysis measurement instrument.
10. Press Ref.Value key.
11. Enter the stable value from the dialysis measurement instrument as reference value.
12. Acknowledge with Calibration key.
13. Acknowledge and store complete calibration procedure with O.K. key.
14. Remove dialysis measurement instrument.

4.10.4.3.2 Calibration Pressure Sensor Dialysate Fluid Outlet PDA

The calibration with the automatic acceptance of the reference values from the HDM 99 (or a similar unit) is performed according to the description of the pressure sensors for the blood side.

The dialyser tubings must be free of air.

Please ensure that the dialysis measurement instrument and connection tubing are at the same level as the rinsing bridge.

- Dialysis measurement instrument (e.g. HDM 99)

1. Connect dialysis measurement instrument between dialyser couplings.
2. Set degassing control valve RVE to 50 %.
3. Open air separator valve **VLA** of the air separator **LA**.

PDA Calibration Point -400 mmHg

4. Press *PDA* Calibration key.
5. Increase the speed of the degassing pump **EP**, until a negative pressure of -400 mmHg (± 10 mmHg) is displayed at the dialysis measurement instrument.
6. Press VLA CLOSED key to close **VLA**. Now **PDA** is separated from **EP** and thus very stable.
7. Press Ref.Value key.
8. Enter the stable value from the dialysis measurement instrument as reference value.
9. Acknowledge with the Calibration key.
10. Press VLA OPEN key to open **VLA**.

PDA Calibration Point -100 mmHg

11. Slowly decrease the speed of the degassing pump **EP**, until a negative pressure of -100 mmHg (± 10 mmHg) is displayed at the dialysis measurement instrument.
12. Press VLA CLOSED key to close **VLA**.
13. Press Ref.Value key.
14. Enter the stable value from the dialysis measurement instrument as reference value.
15. Acknowledge with Calibration key.
16. Acknowledge and store complete calibration procedure with O.K. key.
17. Remove dialysis measurement instrument.

4.10.4.4 Calibration Degassing Temperature Sensor TSE

Prior to Calibration

- Use calibrated dialysis measurement instrument
- Wait until Dialog has reached working temperature

You can calibrate the degassing temperature sensor **TSE**. The following calibration points are used:

TSE degassing temperatur sensor: 30 °C, 40 °C, 85 °C

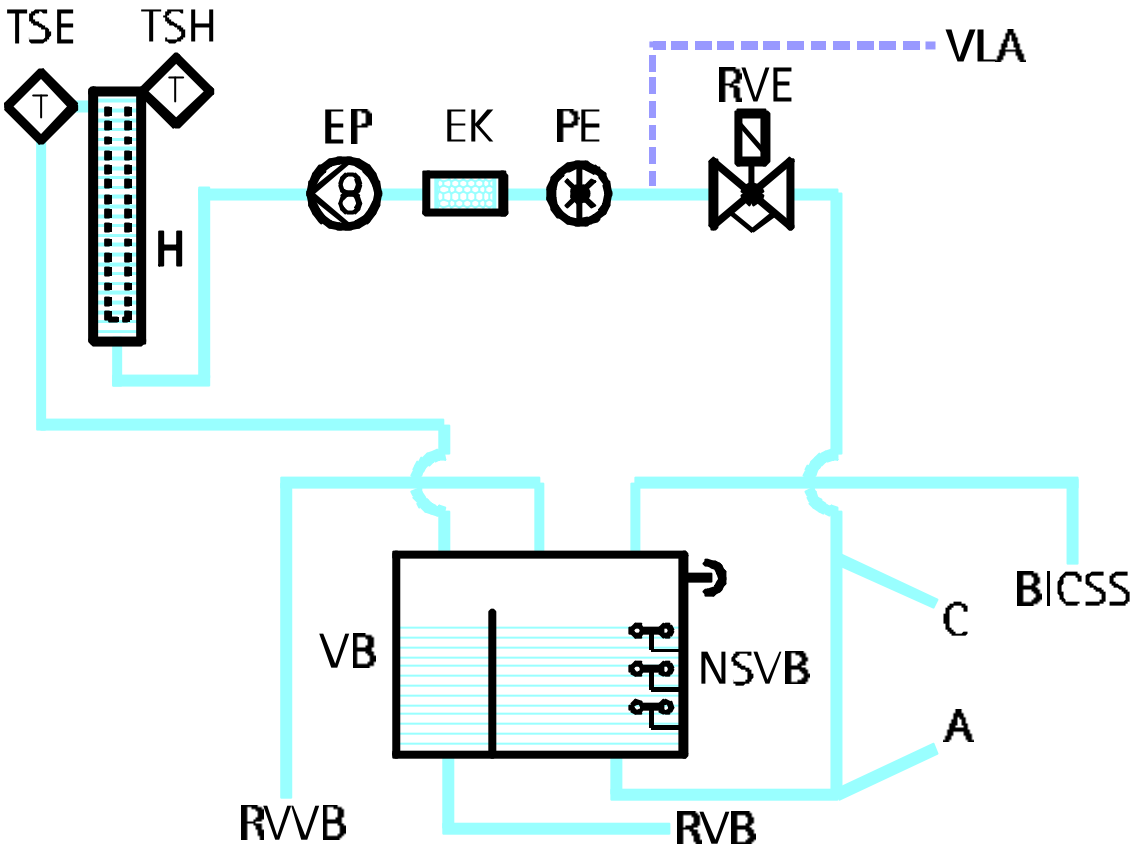
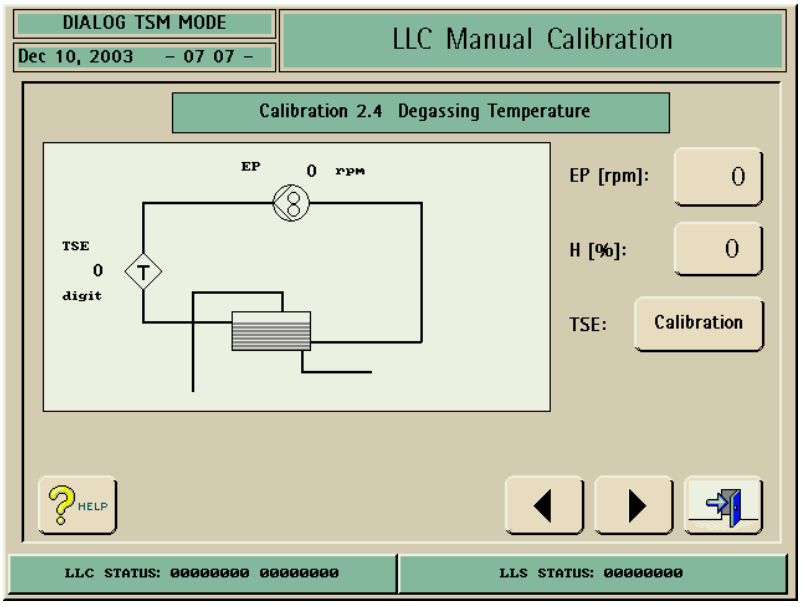


Fig.: Temperature Circulation



1. Activate the *LLC Manual Calibration* menu with the *LLC Manual Calibration* key in the *Manual Test and Calibration* menu.
2. Activate the *Degassing Temperature* menu by pressing on the line *Calibration 2.4 Degassing Temperature*. The following menu is displayed.
3. Press the ◀ or ▶ key to skip to the previous or to the next calibration menu.

4.10.4.4.1 Calibration TSE

The calibration with the automatic acceptance of the reference values from the HDM 99 (or a similar unit) is performed according to the description of the pressure sensors for the blood side.

- Dialysis measurement instrument (e.g. HDM 99)
- Adapter set (coupling/tubing/dialyser couplings)

1. Connect the adapter set between the temperature sensor **TSE** and upline tank **VB**.
2. Connect dialysis measurement instrument to adapter set.
3. Set degassing pump **EP** to 1800 min^{-1}.
4. Press *TSE* Calibration key.

TSE Calibration Point 30 °C

5. Increase heater power (in %) slowly, until a stable temperature value of 30 °C (± 2 °C) is displayed at the dialysis measurement instrument.
6. Press Ref.Value key.
7. Enter the stable value from the dialysis measurement instrument as reference value.
8. Acknowledge with the Calibration key.

TSE Calibration Point 40 °C

9. Increase heater power (in %) slowly, until a stable temperature value of 40 °C (± 2 °C) is displayed at the dialysis measurement instrument.
10. Press Ref.Value key.
11. Enter the stable value from the dialysis measurement instrument as reference value.
12. Acknowledge with the Calibration key.

TSE Calibration Point 85 °C

13. Slowly increase heater power (in %), until a stable temperature value of 85 °C (± 2 °C) is displayed at the dialysis measurement instrument.
14. Press Ref.Value key.
15. Enter the stable value from the dialysis measurement instrument.
16. Acknowledge with the Calibration key.
17. Acknowledge and store complete calibration procedure with O.K. key.
18. Rinse briefly with flow pump **FPE** to cool down the water (menu 1.9, in *LLC Manual Test*).
19. Stop degassing pump **EP** and disconnect adapter set.

4.10.4.5 Calibration Dialysis Temperature Sensors TSBIC and TSD/TSD_S

The conductivity sensors BICLF and ENDLF/ENDLF_S have to be calibrated after every calibration of the temperature sensors TSBIC/TSD/TSD_S (in menu (*LLC Manual Calibration, Calibration 2.6 Conductivity*).

Dialysis Measurement Instrument (e.g. HDM 99)

Technical Data:

- Temperature accuracy: ≤ ±0.2 °C
- Temperature resolution minimum 0.1 °C

Prior to Calibration

- Use calibrated dialysis measurement instrument
- Wait until Dialog has reached working temperature

The following calibration points are used:

- Calibration points **TSBIC/TSD/TSD**_S: 30 °C, 38 °C, 50 °C
- Temperature deviation: ±2 °C
  Temperature oscillation range: ± 1 digit/0.1 °C (displayed value of Dialog) over 10 s, i.e. the temperature should be constant over a time period of 10 s.

Measurement of the Temperature and the Conductivity
The measurement sensor for temperature and conductivity of the dialysis measurement instrument is connected between **FPE** and the inlet to the balance chamber (see figure).

Measurement of the Flow
Connect the dialyser couplings to the flow sensor of the dialysis measurement instrument. The flow sensor is connected to the dialysis measurement instrument (see figure, depends on applied dialysis measurement instrument).

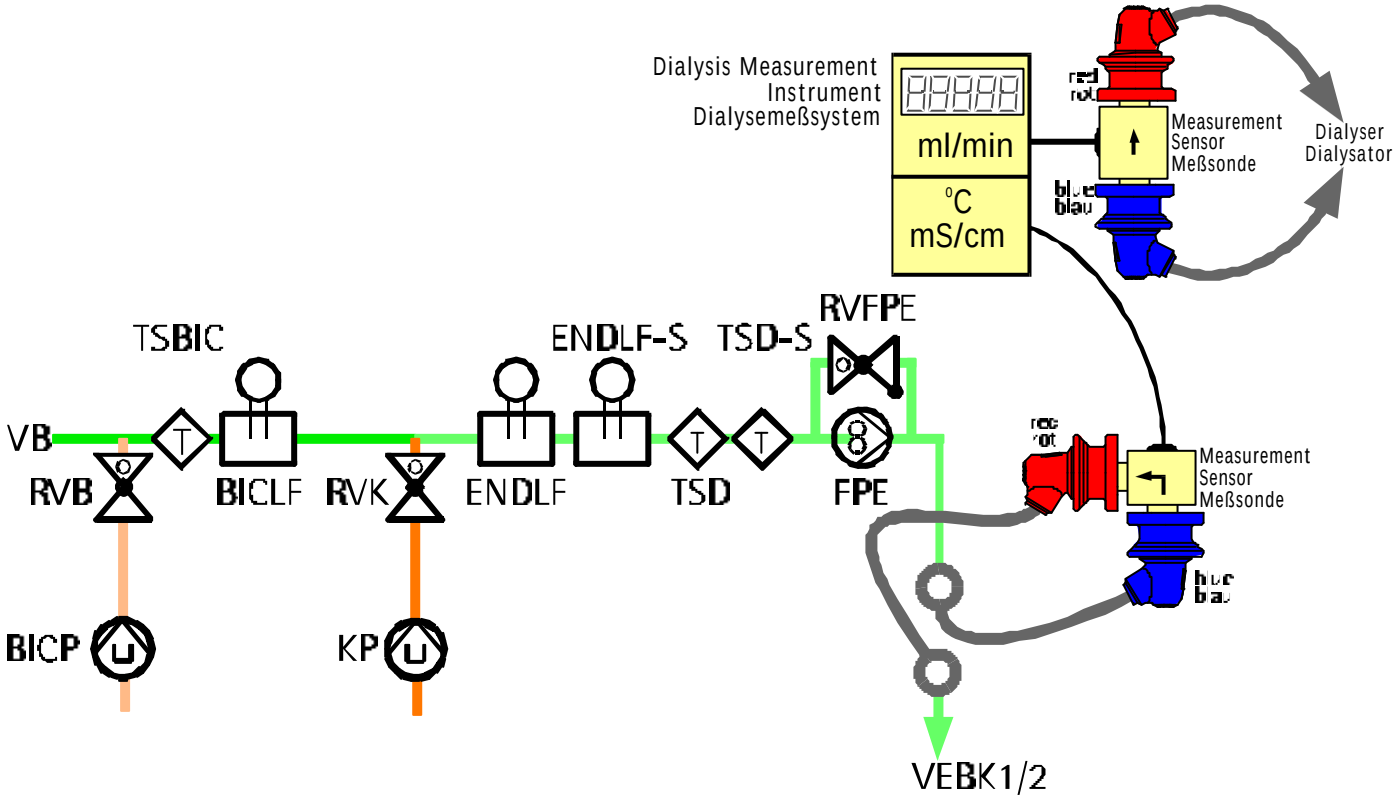
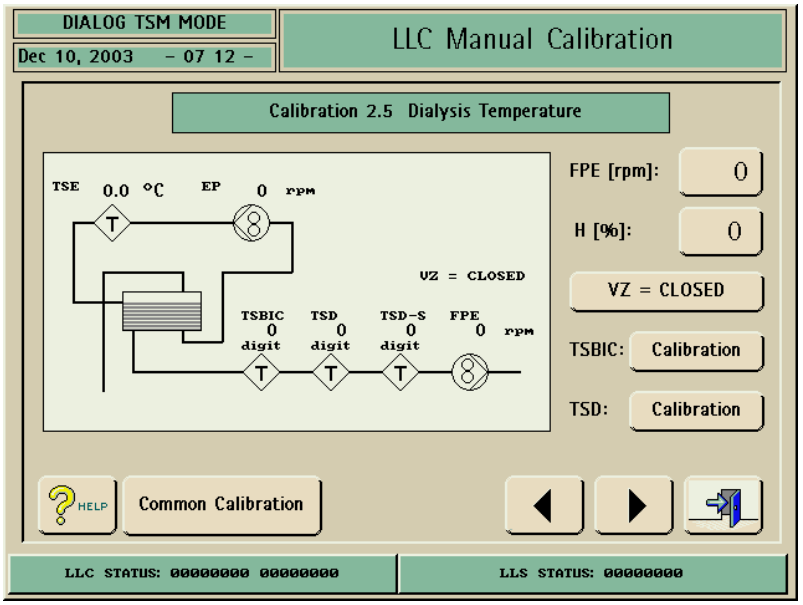


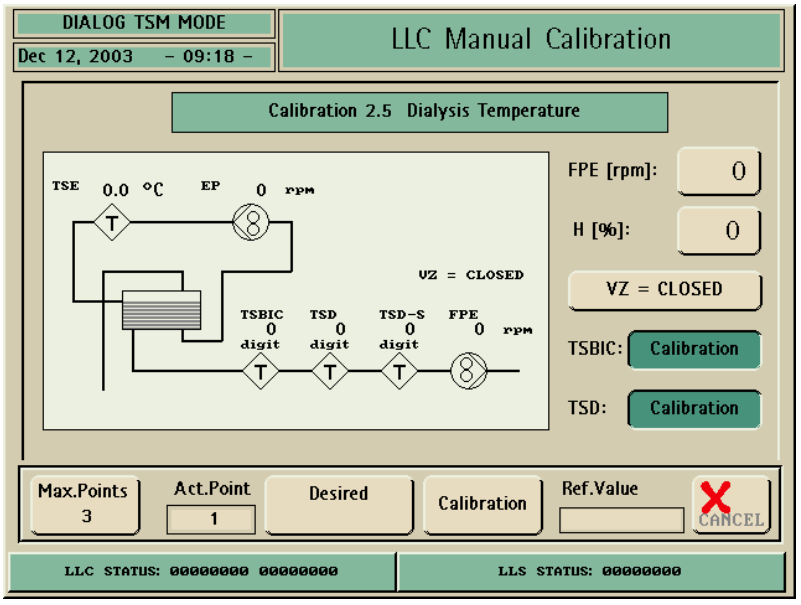
Fig.: Dialysate Preparation



1. Activate the *LLC Manual Calibration* menu with the *LLC Manual Calibration* key in the *Manual Test and Calibration* menu.
2. Activate the *Dialysis Temperature* menu by pressing on the line *Calibration 2..5 Dialysis Temperature*. The following menu is displayed.
3. Press the ◀ or ▶ key to skip to the previous or to the next calibration menu.

4.10.4.5.1 Calibration TSBIC, TSD/TSD_S via RS-232

Dialysis measurement instrument connected to RS 232 interface (SW ≥ 6.20).



A dialysis measurement instrument (HDM ≥ 99 with a software version ≥ 3.52) can be connected to the RS 232 interface for calibration.

Press the Common Calibration key to calibrate the temperature sensors **TSBIC** and **TSD/TSD_S**. A calibration window is opened if the key is selected.

- Dialysis measurement instrument (e.g. HDM 99) and DCI option (art. no. 770 7218) or a D-Sub zero modem cable
- Adapter set (coupling, tubing, dialyser couplings)

1. Connect dialysis measurement instrument between **FPE** and balance chamber, to the RS 232 interface and switch on machine.
2. Connect dialyser couplings to flow meter (adapter of the dialysis measurement instrument).
3. Increase slowly the speed of **FPE**, until a flow of 750 ml/min ±50 ml/min is reached.
4. Press Common Calibration key for a combined calibration of **TSBIC** and **TSD/TSD_S**. The circulation valve **VZ** stays closed.

Calibration Point 30 °C

5. Increase slowly heater power (in %) until a stable temperature value of 30 °C ±2 °C is displayed at the dialysis measurement instrument.

   Pay attention to the deviation range of ±0.1 °C over 10 s at the dialysis measurement instrument.

6. Compare the stable reference value in the Ref.Value X window with the desired value in the Desired Value window and acknowledge with the Calibration key.

   - The reference value is taken over in the Desired Value window.
   - The next calibration point is displayed in the Act.Point X window.

Calibration Point 38 °C

7. Increase slowly heater power until a stable temperature value of 38 °C ±2 °C is displayed at the dialysis measurement instrument.

   Pay attention to the deviation range of ±0.1 °C over 10 s at the dialysis measurement instrument.

   Note

   Note the value of the heater power, because this value is required for the calibration of the conductivity.

8. Compare the stable reference value in the Ref.Value X window with the desired value in the Desired Value window and acknowledge with the Calibration key.

   - The reference value is taken over in the Desired Value window.
   - The next calibration point is displayed in the Act.Point X window.

Calibration Point 50 °C

9. Increase slowly heater power until a stable temperature value of 50 °C ±2 °C is displayed at the dialysis measurement instrument.

   Pay attention to the deviation range of ±0.1 °C over 10 s at the dialysis measurement instrument.

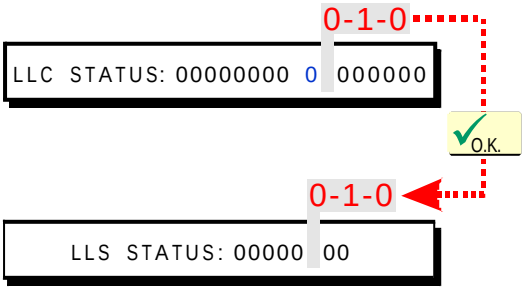
10. Compare the stable reference value in the Ref.Value X window with the desired value in the Desired Value window and acknowledge with the Calibration key.

    - The reference value is taken over in the Desired Value window.

11. Acknowledge and save the completed calibration procedure with O.K. key.

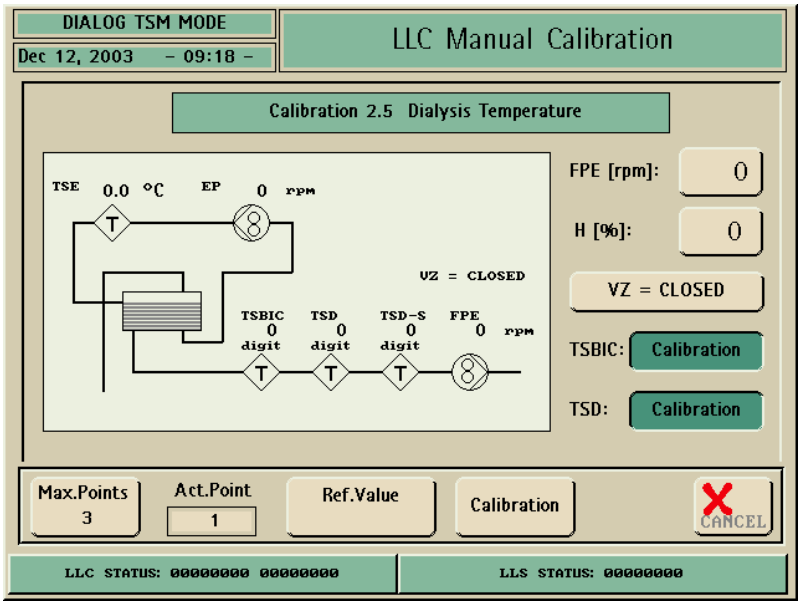
    Note

    Pay attention to the *LLC Status* and LLS Status windows. The bit sequence 0 - 1 - 0 must be identical in the *LLC Status* and LLS Status windows during the saving procedure. The calibration data are saved only after the bit sequence 0 - 1 - 0 (see figure).



4.10.4.5.2 Calibration TSBIC, TSD/TSD_S

Without automatic acceptance of the reference value (SW < 6.20).



Press the Common Calibration key to calibrate the temperature sensors **TSBIC** and **TSD/TSD_S**. A calibration window is opened if the key is selected.

- Dialysis measurement instrument (e.g. HDM 99)
- Adapter set (coupling, tubing, dialyser couplings)

1. Connect dialysis measurement instrument between **FPE** and balance chamber.
2. Connect dialyser couplings to flow meter (adapter of the dialysis measurement instrument).
3. Increase slowly the speed of **FPE**, until a flow of 750 ml/min ±50 ml/min is reached.
4. Press Common Calibration key for a combined calibration of **TSBIC** and **TSD/TSD_S**.
   The circulation valve **VZ** stays closed.

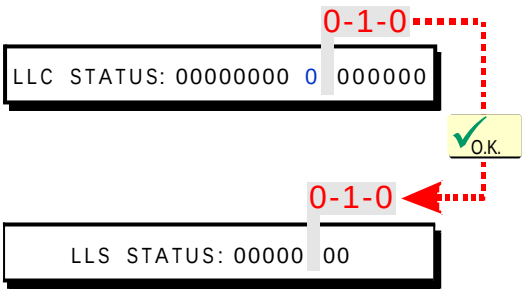
Calibration Point 30 °C

5. Increase slowly heater power (in %) until a stable temperature value of 30 °C ±2 °C is displayed at the dialysis measurement instrument.
   Pay attention to the deviation range of ±0.1 °C over 10 s at the dialysis measurement instrument.
6. Press Ref.Value key.
7. Enter the stable value from the dialysis measurement instrument as reference value and acknowledge with Calibration key.

Calibration Point 38 °C

8. Increase slowly heater power until a stable temperature value of 38 °C ±2 °C is displayed at the dialysis measurement instrument.
   Pay attention to the deviation range of ±0.1 °C over 10 s at the dialysis measurement instrument.
   Note
   Note the value of the heater power, because this value is required for the calibration of the conductivity.
9. Press Ref.Value key.
10. Enter the stable value from the dialysis measurement instrument as reference value and acknowledge with Calibration key.

Calibration Point 50 °C



11. Increase slowly heater power until a stable temperature value of 50 °C ±2 °C is displayed at the dialysis measurement instrument.
    Pay attention to the deviation range of ±0.1 °C over 10 s at the dialysis measurement instrument.
12. Press Ref.Value key.
13. Enter the stable value from the dialysis measurement instrument as reference value and acknowledge with Calibration key.
14. Acknowledge and save the completed calibration procedure with O.K. key.

Note

Pay attention to the *LLC Status* and LLS Status windows. The bit sequence 0 - 1 - 0 must be identical in the *LLC Status* and LLS Status windows during the saving procedure. The calibration data are saved only after the bit sequence 0 - 1 - 0 (see figure).

4.10.4.6 Calibration Conductivity Sensors Bicarbonate BICLF and END Conductivity ENDLF/ENDLF_S

If the conductivity sensor BICLF or ENDLF/ENDLF_S is exchanged: the temperature sensors TSBIC andTSD/TSD_S must be calibrated prior to the calibration of the conductivity sensors BICLF/ENDLF/ENDLF_S.

Dialysis Measurement Instrument (e.g. HDM 99)

Technical Data:

- Temperature coefficient α = 2.10 %/°C (set)
- Reference temperature T_{Ref} = 25 °C (set)
- Correct cell constant (set)
- Conductivity accuracy: ≤ ±0.1 mS/cm
- Conductivity resolution 0.01 mS/cm

Prior to Calibration of BICLF/ENDLF/ENDLF_S

- Use calibrated dialysis measurement instrument
- Perform a cirto-thermal disinfection
- Wait until Dialog has reached working temperature
- Calibrate temperature sensors TSBIC/TSD/TSD_S

Test and Calibration Solution for BICLF

The applied acid concentrate used as test and calibration solution (if not available use acetate) must be diluted according to the prerequisites with deionized water. The components of the acid concentrate are listed in table 1.

Nominal Composition of Ready for Use Dialysate According to Data on Canister (1 l Acid Concentrate + 1,225 BIC + 32.775 l Deionized Water)

Component	Concentration [mmol/l]	max. Oscillation Range
Sodium	138	0
Potassium	2	2
Calcium	1.5	0.5
Magnesium	0.5	0.5
Chlorine	109	3
Acetate	3	1
Bicarbonate	32	1
Glucose	0 g/l	1 g/l
Osmolarity	292 mOsm/l	5 mOsm/l

Table 1

The following B. Braun acid concentrates can be used:
e.g. SW376A, SW163A, SW 196A, SW127A, SW93A, SW102A, SW380A, SW95A, SW139A, SW381A, SW178A, SW393A, SW195A
If acid concentrates are not available the following B. Braun acetate concentrates can be used as an alternative:
e.g. SW44 and SW 174
If acid concentrate from B. Braun is not available acid concentrate from a second source can be used. The composition is listed in table 1.

Composition of Calibration Solution for BICLF

Acid concentrate is diluted with deionized water with a ratio of 1:4 (or 1:4.5 with acete) to calibrate the BICLF sensor, i.e. bicarbonate concentrate is not used.

Composition of Calibration Solution for ENDLF/ENDLF_S

The undiluted acid concentrate (if not available use acetate) is used to calibrate the ENDLF/ENDLF_S sensors (see table 1).

Calibration Points for BICLF and ENDLF/ENDLF_S

The following calibration points are used:

- Calibration points **BICLF**: 0 mS/cm, 3 mS/cm, 5.8 mS/cm
- Calibration points **ENDLF/ENDLF_S**: 0 mS/cm, 14.0 mS/cm
- Conductivity calibration point deviation: 0.2 mS/cm
- Conductivity oscillation range: ± 1 digit/0.1 mS/cm (displayed value of Dialog) over 10 s, i.e. the conductivity should be constant over a time period of 10 s.
- Reference temperature: 38 °C ±2 °C
- Temperature oscillation range: ± 1 digit/0.1 °C (displayed value of Dialog) over 10 s, i.e. the temperature should be constant over a time period of 10 s.

Calibration

The temperature sensors **TSBIC/TSD/TSD_S** must be calibrated prior to the calibration of the conductivity sensors **BICLF/ENDLF/ENDLF_S** (in menu *LLC Manual Calibration*, *Calibration 2.5 Dialysis Temperature*).

Measurement of the Temperature and the Conductivity

The measurement sensor for temperature and conductivity of the dialysis measurement instrument is connected between **FPE** and the inlet to the balance chamber (see figure).

Measurement of the Flow

Connect the dialyser couplings to the flow sensor of the dialysis measurement instrument. The flow sensor is connected to the dialysis measurement instrument (see figure, depends on applied dialysis measurement instrument).

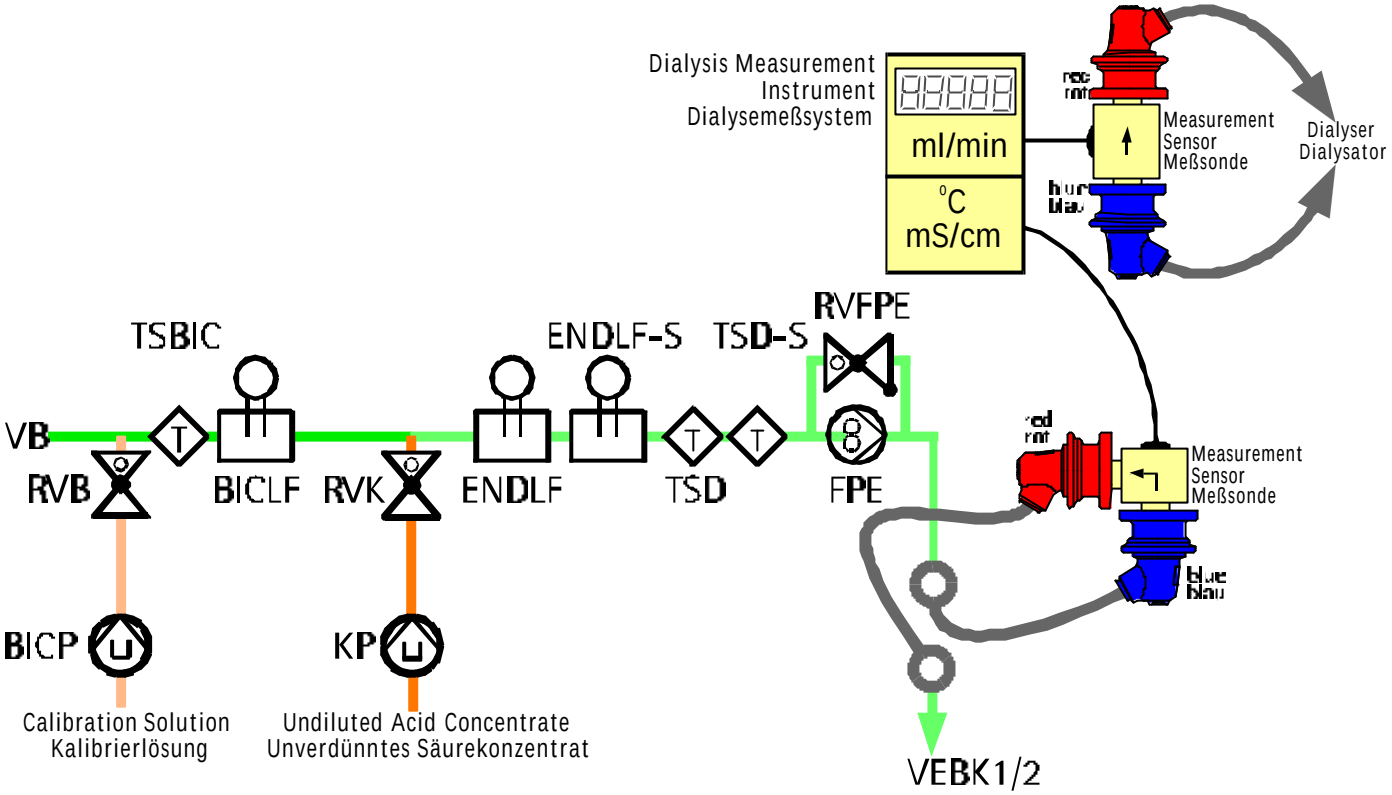
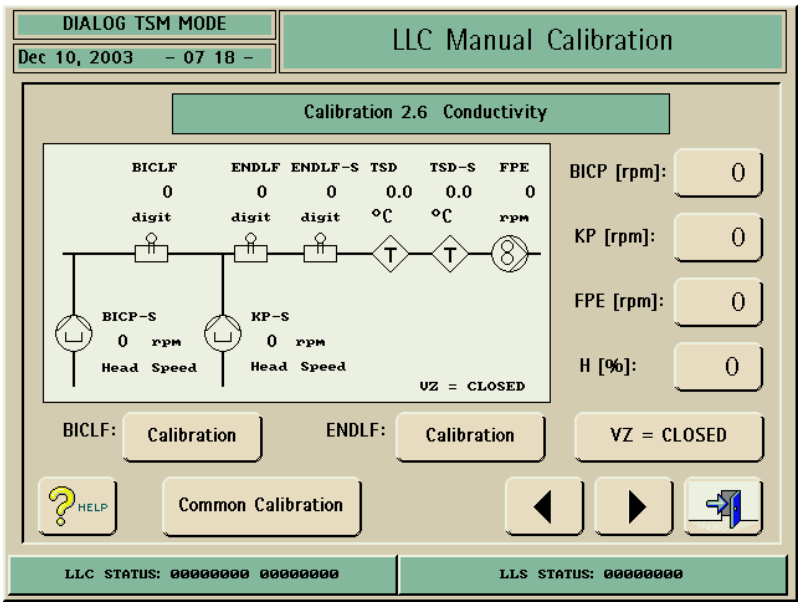
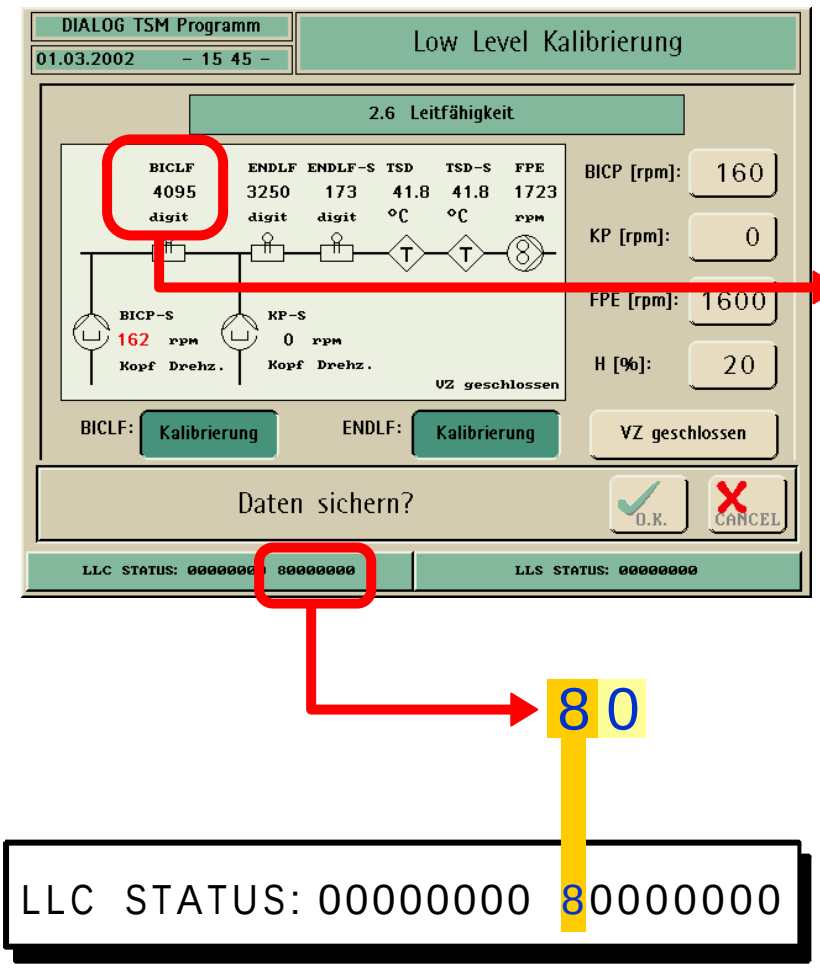


Fig.: Dialysate Preparation



1. Activate the *LLC Manual Calibration* menu with the *LLC Manual Calibration* key in the *Manual Test and Calibration* menu.
2. Activate the *Calibration Conductivity* menu by pressing on the line *Calibration 2.6 Conductivity*. The following menu is displayed.
3. Press the ◀ or ▶ key to skip to the previous or to the next calibration menu.



Note

Do not calibrate the conductivity sensors **BICLF/ENDLF/ENDLF_S** with the Common Calibration key, because the reference point 14 mS/cm for the **BICLF** sensor is at the end of it's measurement limits (digit value ≥ 4095).

Thus the calibration values for the **BICLF** sensor could be invalid, i.e. the following digit value is displayed in the *LLC Status* window (see figure):

8 X X X X X X X = *Calibration data out of range*

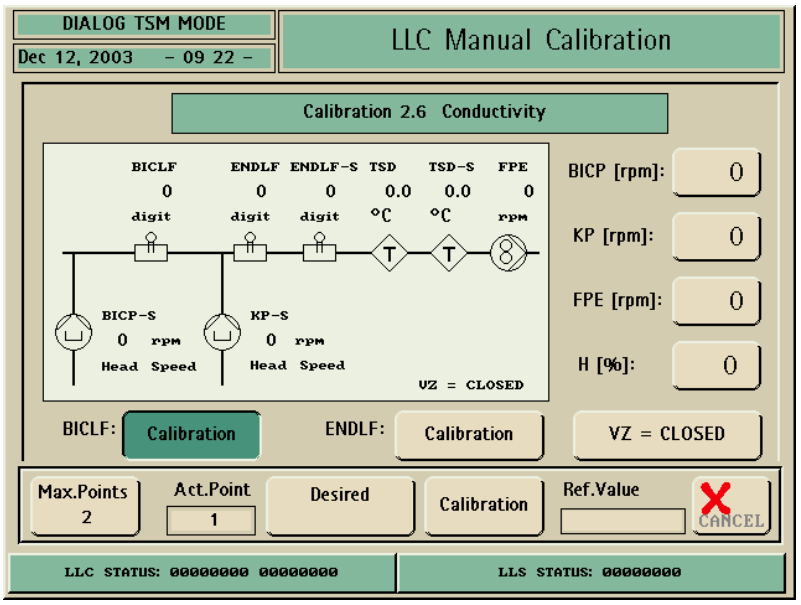
If the calibration was successful the following digit value is displayed:

0 X X X X X X X

4.10.4.6.1 Calibration BICLF via RS-232

Dialysis measurement instrument connected to RS 232 interface (SW ≥ 6.20).

Composition of the calibration solution for BICLF
To calibrate the BICLF sensor deionized water is mixed with the respective acid concentrate, i.e. bicarbonate concentrate is not used.



A dialysis measurement instrument (HDM ≥ 99 with a software version ≥ 3.52) can be connected to the RS 232 interface for calibration.

Press the *BICLF* Calibration key to calibrate the conductivity sensor **BICLF**. A calibration window is opened if the key is selected.

There is no cyclic switching of the balance chambers during the conductivity calibration. Thus, a continuous flow is accomplished which is necessary for the calibration. The following valves are opened **VEBK2/VDEBK2** and **VABK1/VDABK1**.
Pay attention that air bubbles do not build up in the reference sensor during calibration.

- Dialysis measurement instrument (e.g. HDM 99) and DCI option (art. no. 770 7218) or a D-Sub zero modem cable
- Calibration solution: diluted acid concentrate
- Adapter set (coupling, tubing, dialyser couplings)

1. Connect dialysis measurement instrument between **FPE** and balance chamber, to the RS 232 interface and switch on machine.
2. Connect dialyser couplings to flow meter (adapter of the dialysis measurement instrument).
3. Increase slowly the speed of **FPE**, until a flow of 750 ml/min ±50 ml/min is reached.

BICLF Calibration Point 0 mS/cm

4. Change slowly heater power, until a stable temperature value of 38 °C ±2 °C is displayed at the dialysis measurement instrument.
   Note
   Use the heater power value you noted during the calibration of **TSBIC/TSD/TSD_S**.
5. Press *BICLF* Calibration key.
6. Press the Max.Points X key and enter 3 for a three point calibration.
   Speed **BICP**: 0 min^{-1}
   Speed **KP**: 0 min^{-1}
7. Compare the stable reference value in the Ref.Value X window with the desired value in the Desired Value window and acknowledge with the Calibration key.
   - The reference value is taken over in the Desired Value window.
   - The next calibration point is displayed in the Act.Point X window.

   Note
   Pay attention to the deviation range for the conductivity and the temperature at the dialysis measurement instrument.

Do not change by mistake the suction rods and the pumps **BICP/KP**.
A calibration solution with a ratio of approx. 1 : 4 is necessary for the 3 mS/cm and 5.8 mS/cm calibration, i.e. 1 l acid concentrate + 4 l water.
If acid concentrate is not available a calibration solution with acetate can be used. The ratio is approx. 1 : 4.5, i.e. 1 l acetate + 4.5 l water.

BICLF Calibration Point 3 mS/cm

8. Connect blue suction rod to the diluted acid concentrate (calibration solution).
9. Increase slowly the speed (approx. 100 - 110 min^{-1}) of the bicarbonate pump **BICP**, until a stable conductivity value of 3.0 mS/cm ±0.2 mS/cm is displayed at the dialysis measurement instrument.
   Pay attention to the deviation range for the conductivity and the temperature at the dialysis measurement instrument.
10. Compare the stable reference value in the Ref.Value X window with the desired value in the Desired Value window and acknowledge with the Calibration key.
    - The reference value is taken over in the Desired Value window.
    - The next calibration point is displayed in the Act.Point X window.

BICLF Calibration Point 5.8 mS/cm

11. Increase slowly the speed (approx. 200 - 210 min^{-1}) of the bicarbonate pump BICP, until a stable conductivity value of 5.8 mS/cm ±0.2 mS/cm is displayed at the dialysis measurement instrument.

    Pay attention to the deviation range for the conductivity and the temperature at the dialysis measurement instrument.

12. Compare the stable reference value in the Ref.Value X window with the desired value in the Desired Value window and acknowledge with the Calibration key.

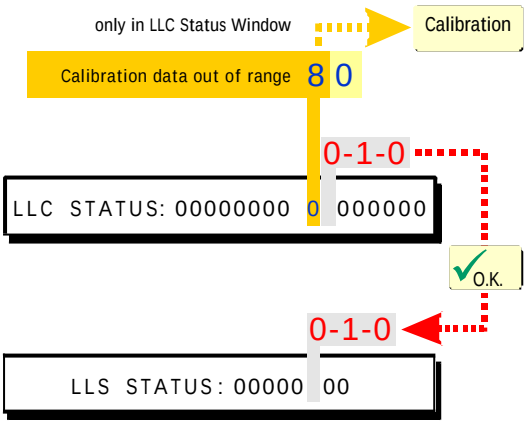
    - The reference value is taken over in the Desired Value window.

Note

Pay attention to the *LLC Status* window. The calibration data are only valid if the following digit value is displayed in the *LLC Status* window: **0 X X X X X X X** (see figure).

If the calibration value for **BICLF** is at the limit range the calibration data could be invalid. Thus the following digit value is displayed in the *LLC Status* window **8 X X X X X X X** (see figure). Repeat calibration procedure.

13. Acknowledge completed calibration procedure with O.K. key (calibration data are saved).



Note

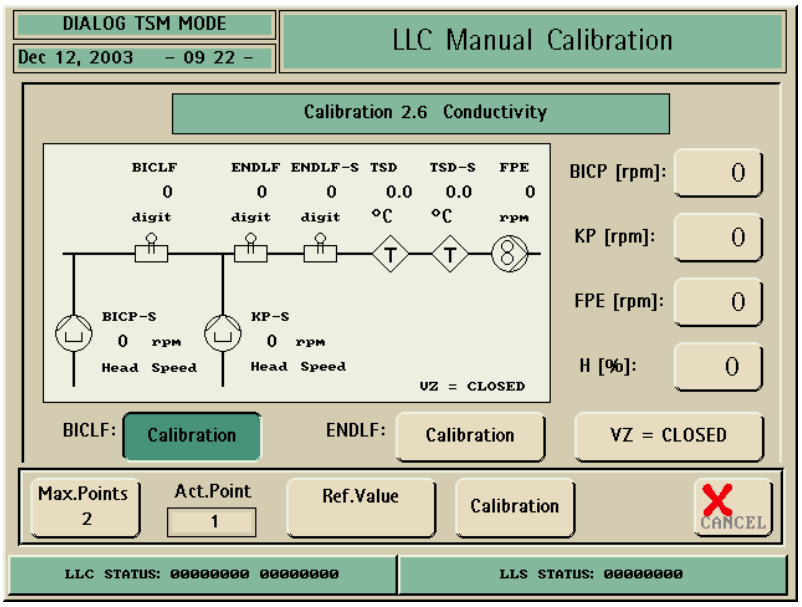
Pay attention to the *LLC Status* and *LLS Status* windows. The bit sequence 0 - 1 - 0 must be identical in the *LLC Status* and *LLS Status* windows during the saving procedure. The calibration data are saved only after the bit sequence 0 - 1 - 0 (see figure).

Proceed with the calibration of the conductivity sensors ENDLF/ENDLF_S after the calibration of BICLF.

4.10.4.6.2 Calibration BICLF

Without automatic acceptance of the reference value (SW < 6.20).

Composition of the calibration solution for BICLF
To calibrate the BICLF sensor deionized water is mixed with the respective acid concentrate, i.e. bicarbonate concentrate is not used.



Press the *BICLF* Calibration key to calibrate the conductivity sensor **BICLF**. A calibration window is opened if the key is selected.

There is no cyclic switching of the balance chambers during the conductivity calibration. Thus a continuous flow is accomplished which is necessary for the calibration. The following valves are opened **VEBK2/VDEBK2** and **VABK1/VDABK1**.
Pay attention that air bubbles do not build up in the reference sensor during calibration.

- Dialysis measurement instrument (e.g. HDM 99)
- Calibration solution: diluted acid concentrate
- Adapter set (coupling, tubing, dialyser couplings)

BICLF Calibration Point 0 mS/cm

1. Connect dialysis measurement instrument between **FPE** and balance chamber.
2. Connect dialyser couplings to flow meter (adapter of the dialysis measurement instrument).
3. Increase slowly the speed of **FPE**, until a flow of 750 ml/min ±50 ml/min is reached.
4. Change slowly heater power, until a stable temperature value of 38 °C ±2 °C is displayed at the dialysis measurement instrument.
   Note
   Use the heater power value you noted during the calibration of **TSBIC/TSD/TSD_S**.
5. Press *BICLF* Calibration key.
6. Press the Max.Points X key and enter 3 for a three point calibration.
   Speed **BICP**: 0 min^{-1}
   Speed **KP**: 0 min^{-1}
7. Enter the stable value from the dialysis measurement instrument as reference value and acknowledge with the Calibration key.
   Note
   Do not confirm the set value 0.00 mS/cm but by all means enter the reference value.
   Pay attention to the deviation range for the conductivity and the temperature at the dialysis measurement instrument.

Do not change by mistake the suction rods and the pumps **BICP**/**KP**.
A calibration solution with a ratio of approx. 1 : 4 is necessary for the 3 mS/cm and 5.8 mS/cm calibration, i.e. 1 l acid concentrate + 4 l water.
If acid concentrate is not available a calibration solution with acetate can be used. The ratio is approx. 1 : 4.5, i.e. 1 l acetate + 4.5 l water.

BICLF Calibration Point 3 mS/cm

8. Connect blue suction rod to the diluted acid concentrate (calibration solution).
9. Increase slowly the speed (approx. 100 - 110 min^{-1}) of the bicarbonate pump **BICP**, until a stable conductivity value of 3.0 mS/cm ±0.2 mS/cm is displayed at the dialysis measurement instrument.
   Pay attention to the deviation range for the conductivity and the temperature at the dialysis measurement instrument.
10. Press Ref.Value key.
11. Enter the stable value from the dialysis measurement instrument as reference value and acknowledge with Calibration key.

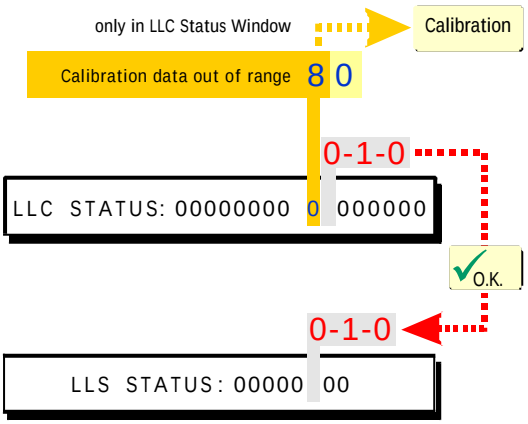
BICLF Calibration Point 5.8 mS/cm

12. Increase slowly the speed (approx. 200 - 210 min^{-1}) of the bicarbonate pump BICP, until a stable conductivity value of 5.8 mS/cm ±0.2 mS/cm is displayed at the dialysis measurement instrument.
    Pay attention to the deviation range for the conductivity and the temperature at the dialysis measurement instrument.
13. Press Ref.Value key.
14. Enter the stable value from the dialysis measurement instrument as reference value and acknowledge with Calibration key.

    Note

    Pay attention to the *LLC Status* window. The calibration data are only valid if the following digit value is displayed in the *LLC Status* window: **0 X X X X X X X** (see figure).

    If the calibration value for **BICLF** is at the limit range the calibration data could be invalid. Thus the following digit value is displayed in the *LLC Status* window **8 X X X X X X X** (see figure). Repeat calibration procedure.



15. Acknowledge completed calibration procedure with O.K. key (calibration data are saved).

    Note

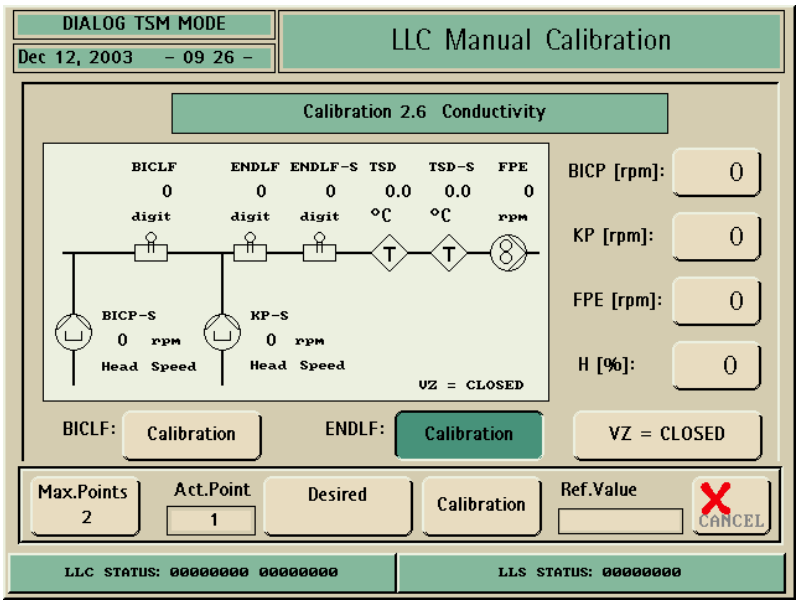
    Pay attention to the *LLC Status* and *LLS Status* windows. The bit sequence 0 - 1 - 0 must be identical in the *LLC Status* and *LLS Status* windows during the saving procedure. The calibration data are saved only after the bit sequence 0 - 1 - 0 (see figure).

Proceed with the calibration of the conductivity sensors ENDLF/ENDLF_S after the calibration of BICLF.

4.10.4.6.3 End Conductivity Sensor ENDLF/ENDLF_S via RS-232

Dialysis measurement instrument connected to RS 232 interface (SW ≥ 6.20).

The composition of the undiluted acid concentrate is listed in table 1.



A dialysis measurement instrument (HDM ≥ 99 with a software version ≥ 3.52) can be connected to the RS 232 interface for calibration.

Press the *ENDLF* Calibration key to calibrate the conductivity sensor **ENDLF**. A calibration window is opened if the key is selected.

- Calibration solution: undiluted acid concentrate (see table 1)

ENDLF Calibration Point 0 mS/cm

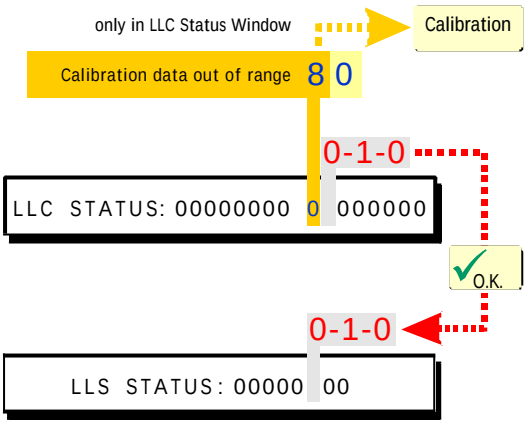
1. Press *ENDLF* Calibration key.

   Speed **BICP**: 0 min^{-1}
   Speed **KP**: 0 min^{-1}

2. Compare the stable reference value in the Ref.Value X window with the desired value in the Desired Value window and acknowledge with the Calibration key.
   - The reference value is taken over in the Desired Value window.
   - The next calibration point is displayed in the Act.Point X window.

ENDLF Calibration Point 14.0 mS/cm

3. Connect the red suction rod to the undiluted acid concentrate.
4. Increase slowly the speed of the concentrate pump **KP** (approx. 115 - 120 min^{-1}), until a stable conductivity value of 14.0 mS/cm ±0.2 mS/cm is displayed at the dialysis measurement instrument.
   Pay attention to the deviation range for the conductivity and the temperature at the dialysis measurement instrument.



5. Compare the stable reference value in the Ref.Value X window with the desired value in the Desired Value window and acknowledge with the Calibration key.

   - The reference value is taken over in the Desired Value window.

   Note

   Pay attention to the *LLC Status* window. The calibration data are only valid if the following digit value is displayed in the *LLC Status* window: **0 X X X X X X X** (see figure).

   If the calibration value for **ENDLF** is at the limit range the calibration data could be invalid. Thus the following digit value is displayed in the *LLC Status* window **8 X X X X X X X** (see figure). Repeat calibration procedure.

6. Acknowledge completed calibration procedure with O.K. key (calibration data are saved).

   Note

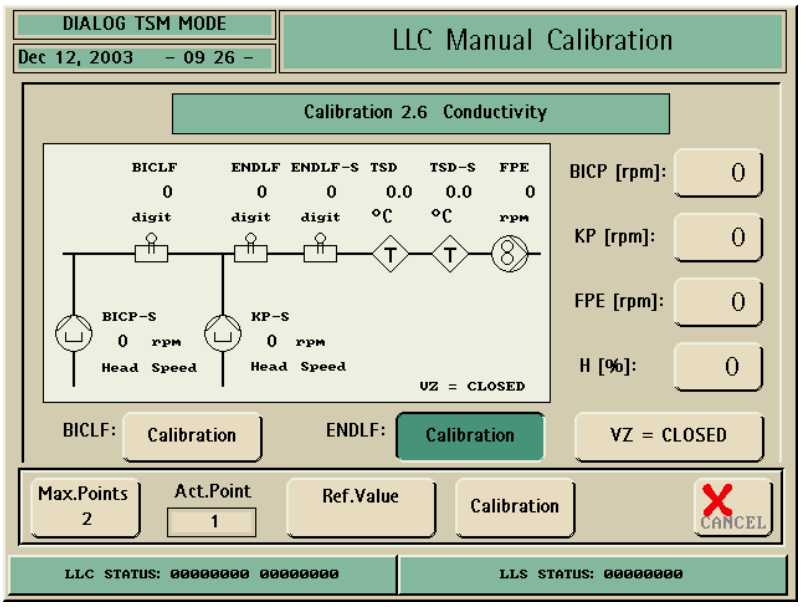
   Pay attention to the *LLC Status* and *LLS Status* windows. The bit sequence 0 - 1 - 0 must be identical in the *LLC Status* and *LLS Status* windows during the saving procedure. The calibration data are saved only after the bit sequence 0 - 1 - 0 (see figure).

7. Stop **FPE**, **BICP** and **KP** and remove dialysis measurement instrument.

4.10.4.6.4 End Conductivity Sensor ENDLF/ENDLF_S

Without automatic acceptance of the reference value (SW < 6.20).

The composition of the undiluted acid concentrate is listed in table 1.



Press the *ENDLF* Calibration key to calibrate the conductivity sensor **ENDLF/ENDLS_S**. A calibration window is opened if the key is selected.

- Calibration solution: undiluted acid concentrate (see table 1)

ENDLF Calibration Point 0 mS/cm

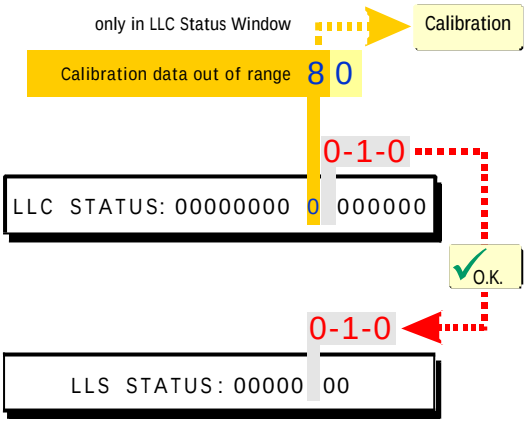
1. Press *ENDLF* Calibration key.

   Speed **BICP**: 0 min^{-1}
   Speed **KP**: 0 min^{-1}

2. Enter the stable value from the dialysis measurement instrument as reference value and acknowledge with the Calibration key.
   Note
   Do not confirm the set value 0.00 mS/cm.
   Pay attention to the deviation range for the conductivity and the temperature at the dialysis measurement instrument.

ENDLF Calibration Point 14.0 mS/cm

3. Connect the red suction rod to the undiluted acid concentrate.
4. Increase slowly the speed of the concentrate pump **KP** (approx. 115 - 120 min^{-1}), until a stable conductivity value of 14.0 mS/cm ±0.2 mS/cm is displayed at the dialysis measurement instrument.
   Pay attention to the deviation range for the conductivity and the temperature at the dialysis measurement instrument.
5. Press Ref.Value key.



6. Enter the stable value from the dialysis measurement instrument as reference value and acknowledge with Calibration key.

   Note

   Pay attention to the *LLC Status* window. The calibration data are only valid if the following digit value is displayed in the *LLC Status* window: **0 X X X X X X** (see figure).

   If the calibration value for **ENDLF** is at the limit range the calibration data could be invalid. Thus the following digit value is displayed in the *LLC Status* window **8 X X X X X X** (see figure). Repeat calibration procedure.

7. Acknowledge completed calibration procedure with O.K. key (calibration data are saved).

   Note

   Pay attention to the *LLC Status* and *LLS Status* windows. The bit sequence 0 - 1 - 0 must be identical in the *LLC Status* and *LLS Status* windows during the saving procedure. The calibration data are saved only after the bit sequence 0 - 1 - 0 (see figure).

8. Stop **FPE**, **BICP** and **KP** and remove dialysis measurement instrument.

4.10.4.7 Calibration Blood Leak Detector Type 1

You can calibrate the blood leak detector **BL** type 1. The rinsing block must have an even temperature for the calibration. If both dialyser couplings are connected to the rinsing bridge the flow pumps **FPA**/**FPE** work in main flow. If only one coupling is connected **FPE** is stopped. The reference solution can be sucked in by **FPA** via the red dialyser coupling. The first calibation point must be performed with clear water. The following calibration points are used:
Blood leck detector: 0 and 1 ‰

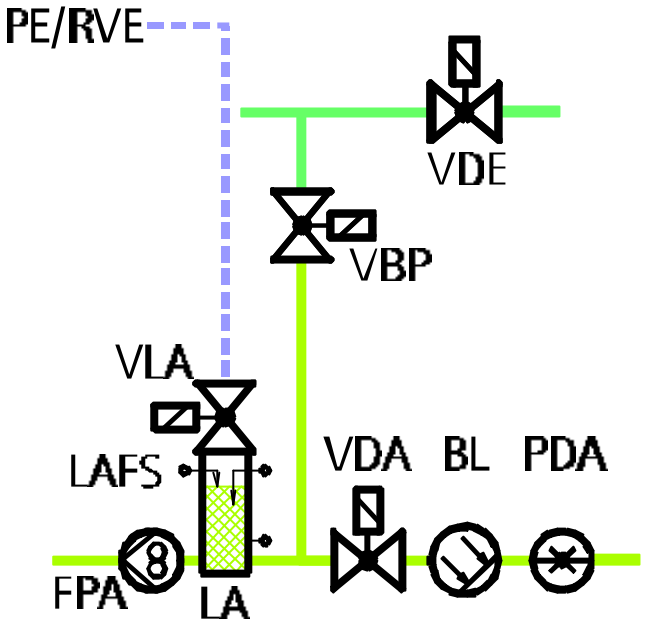
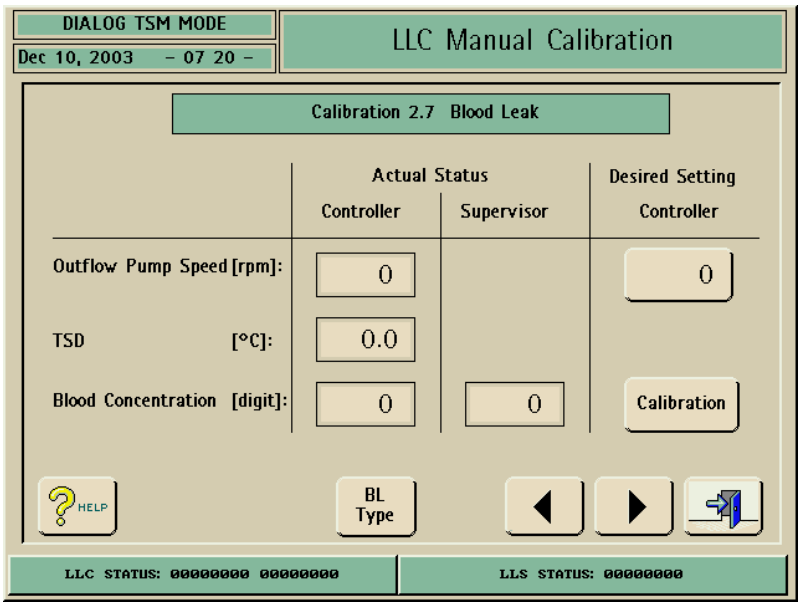


Fig.: Rinsing Bridge with Blood Leak Detector BL

The flow pump **FPE** is automatically stopped, if only one dialyser coupling is connected.

The calibration of the blood leak detector type 1 is devided into three sections:

- Function test
- Calibration
- Check of the current value



1. You can activate the *LLC Manual Calibration* menu with the *LLC Manual Calibration* key in the *Manual Test and Calibration* menu.
2. Activate the *Blood Leak* menu by pressing on the line *Calibration 2. Blood Leak* The following menu is displayed.
3. Press the or key to skip to the previous or to the next calibration menu.

Close front and rear door for the function test and calibration to prevent light irradiation on the sensor.

Leakages
Air and micro-bubbles can lead to incorrect measurement values in the measurement line and can cause fluctuation of the current value.

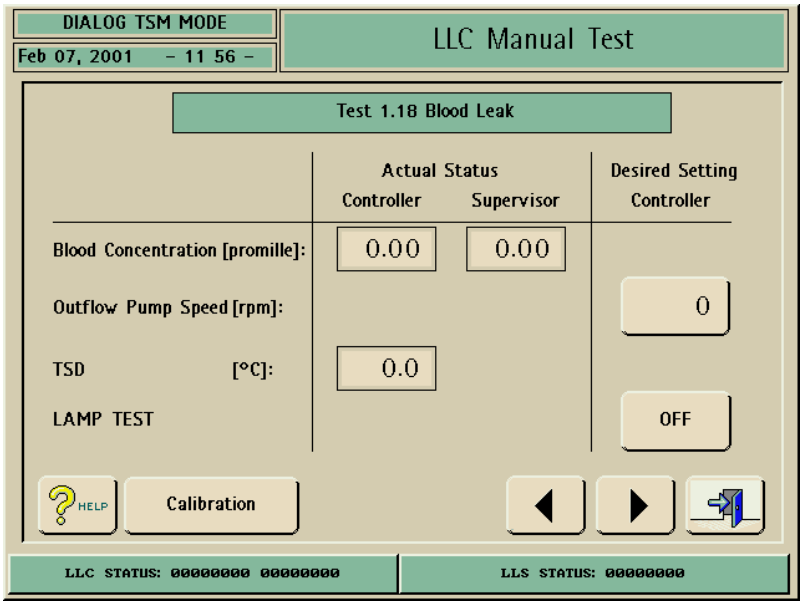
If air is visible check the complete system for leaks in menu 1.20 Test Water Part. After the initialisation phase rinse the blood leak detector approx. 1 min and then perform a leakage test of the system in menu 1.19 Leak Test.

4.10.4.7.1 Function Check Blood Leak Detector Type 1

The following function checks are performed:

- Red and green LED
- Receiver circuit
- Optical efficiency of the detector block

The blood leak detector type 1 (up to art. no. 3451 656B) must be replaced if the function test is not passed. If the values are out of limits the blood leak detector from art. no. 3451 656C can be recalibrated with the potentiometers. The temperature is controlled to approx. 40 °C in menu 1.18.



1. Connect both dialyser couplings to the rinsing bridge.
2. Select menu 1.18 in TSM to perform a function check of the blood leak detector.
3. Rinse the blood leak detector for approx. 1 min with flow pump outlet **FPA** = 2000 min^{-1}, at the beginning of the rinsing time. Thereby possible air bubbles are removed.
4. Rinse blood leak detector for a minimum 30 min with **FPA** = 1000 min^{-1}. Thereby the complete system is warmed up to an even temperature of approx. 40 °C.
5. The *LED Test* is activated with the *LED TEST OFF* key. The *OFF* key switches to the *RED* key as soon as the key is pressed.

   The blood concentration value for the detector signal with switched off LEDs is displayed for approx. 10 sec.

   The blood concentration value of the controller for the switched off *red LED* must be as follows (the supervisor value is uncritical):

Both LEDs switched off	**Low Level Controller**
Blood Concentration Value	< 0.05

The *red LED* is automatically activated after 10 s. The controller value for the switched off *red LED* must be as follows (the supervisor value is uncritical):

red LED	**Low Level Controller**
Blood Concentration Value	2.75 to 3.25

6. Press *LED TEST RED* key, to switch to the *green LED*. The *RED* key switches to the *GREEN* key.

   The *green LED* is tested. The controller value for the switched off *green LED* must be as follows:

green LED	Low Level Controller
Blood Concentration Value	2.00 to 2.50

4.10.4.7.2 Function Check Blood Leak Detector Type 1 (Art. No. 3451 656≥C)

The new version types 1 can be calibrated with the potentiometers P1 and P2 if the current values of the controller are out of limits.

The procedure of the function check is identical with the above description.

5. The *LED Test* is activated with the *LED TEST OFF* key. The *OFF* key switches to the *RED* key as soon as the key is pressed.

   The blood concentration value of the controller for the switched off LEDs must be as follows (the supervisor value is uncritical):

Both LEDs switched off	Actual Status Controller
Blood Concentration	< 0.05

   The *red LED* is automatically activated after 10 s. The controller value for the switched off *red LED* must be as follows (the supervisor value is uncritical):

red LED	Actual Status Controller
Blood Concentration	2.75 to 3.25

5a Only set the actual value to 3.00 with the potentiometer P1 (right potentiometer) if the actual value for the *red LED* is out of limits.

6. Press *LAMP TEST RED* key, to switch to the *green LED*. The *RED* key switches over to *GREEN* key.

   The *green LED* is tested. The controller value for the switched off *green LED* must be as follows:

green LED	Actual Status Controller
Blood Concentration	2.00 to 2.50

6a Only set the actual value to 2.25 with the potentiometer P2 (left potentiometer) if the actual value for the *green LED* is out of limits.

6b Safety paint potentiometers after calibration.

6c Check actual values.

4.10.4.7.3 Calibration Blood Leak Detector Type 1

Close front and rear door for the function test and calibration to prevent light irradiation on the sensor.
Air and micro-bubbles must not be present prior or during the calibration of the detector (if necessary see information 4.10.4.7).
The blood detector must be clean.
The **FPA** must be switched off to prevent a flow during the calibration procedure.
The calibration for the blood leak detector type 1 is performed in two steps:

- Turbidity calibration
- Calibration with reference solution

The calibration of the blood leak detector can be selected from the menu 1.18 with the Calibration key.

- Reference Solution (Red Dye, 770 0911)
- Graduated cylinder 2 litre

7. Both dialyser couplings are connected to the rinsing bridge.
8. Prepare reference solution, i.e.:
   Prepare reference solution with 1 ‰ reference solution, e.g. 2 litre water/2 ml reference solution. The water should have at least 30 °C for an accurate calibration. Mix the reference solution thoroughly.

4.10.4.7.3.1 Turbidity Calibration with Water

9. Press Calibration key. The calibration window is opened.
10. Set **FPA** slowly to zero (with the [-] key of the calculator).
11. Press the Calibration key to activate the first actual calibration point of the automatic calibration.

    After the calibration of the first point the second calibration point is automatically displayed (4.10.4.7.3.2).

    The values must be in the following limits:

	Actual Status Controller	**Actual Status Supervisor**
Blood Concentration [Digit]	- 20 to + 20	215 to 222

4.10.4.7.3.2 Calibration with Reference Solution (Red Dye)

12. Carefully pull off red dialyser coupling to prevent any loss of fluid/entry of air.
13. Carefully insert red dialyser coupling into reference solution (loss of fluid/intake of air).
14. Set **FPA** slowly to 1000 min^{-1} and draw-in approx. 1 l reference solution.
15. Set the **FPA** slowly to zero. If the displayed actual blood concentration value of the controller is stable press the Calibration key to acknowledge.

    The displayed actual blood concentration value must be in the following range, to ensure a large enough resolution:

	Actual Status Controller
Blood Concentration [Digit]	> 200

16. Acknowledge and store completed calibration procedure with O.K. key.

4.10.4.7.4 Actual Value Check Blood Leak Detector Type 1

17. Select menu 1.18 in TSM to check actual value of the blood leak detector.

4.10.4.7.4.1 Check 0 ‰ Blood Concentration

18. Connect red dialyser coupling to rinsing bridge.
19. Set **FPA** slowly to 1000 min^{-1} and rinse.
20. Check blood concentrtion of the controller and supervisor.

    The values for the controller and supervisor must be in the following limits:

	Actual Status Controller	**Actual Status Supervisor**
Blood Concentration [per mil]	0 to 0.2	0 to 0.2

4.10.4.7.4.2 Check 1 ‰ Blood Concentration

21. Set **FPA** slowly to zero.
22. Carefully disconnect red dialyser coupling.
23. Carefully insert red dialyser coupling into remaining reference solution.
24. Set **FPA** slowly to 1000 min^{-1} and draw-in reference solution.
25. Check blood concentration of the controller and supervisor.

    The blood concentrate values for the controller and supervisor must be in the following limits:

	Actual Status Controller	**Actual Status Supervisor**
Blood Concentration [per mil]	0.95 to 1.1	0.95 to1.1

4.10.4.8 Calibration Blood Leak Detector Type 2

You can check and calibrate the blood leak detector **BL** type 2. The rinsing block must have an even temperature for the calibration. If both dialyser couplings are connected to the rinsing bridge the flow pumps **FPA**/**FPE** work in main flow. If only one coupling is connected **FPE** is stopped. The reference solution can be sucked in by the red coupling via **FPA**.

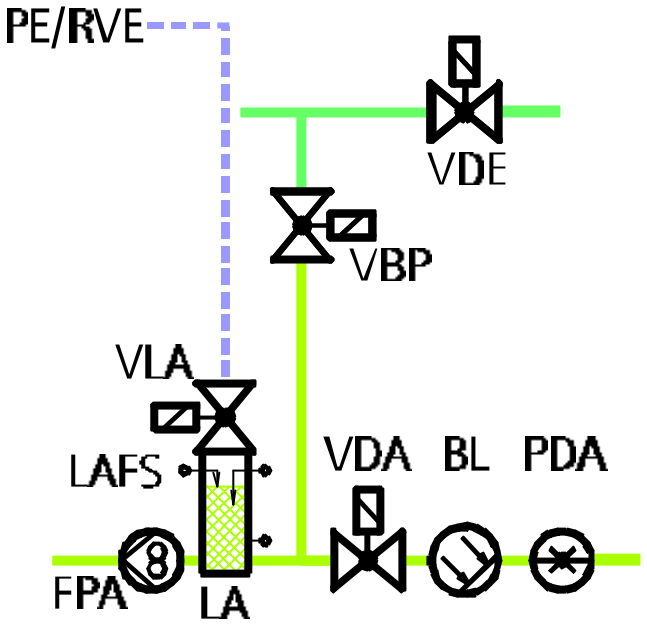


Fig.: Rinsing Bridge with Blood Leak Detector BL

Ordering Information

The blood leak detector type 2 can be ordered under the following art. no.:

Art. No.	Description
3451 9084	Blood leak detector type 2 (for Dialog with rinsing bridge 2)
3451 8940	Blood leak detector type 2 with adapter and assembly parts (for Dialog with rinsing bridge 1)

Settings in TSM Service Program

A Dialog software version number ≥ 3.46 is required for the blood leak detector type 2.
The blood leak detector type 2 must be activated after assembly in the TSM service program.
A citro-thermal disinfection (decalcification) must be performed before initial calibration.

Function Test and Calibration

A function test and a calibration is performed for the blood leak detector type 2.
If a current value is out of limits during the function test exchange the blood leak detector type 2. A calibration of the voltages for the red and green LED is not possible.
Check the blood leak detector type 2 after a citro-thermal disinfection (*LC Manual Test*, *Test 1.18 Blood Leak Detector*).

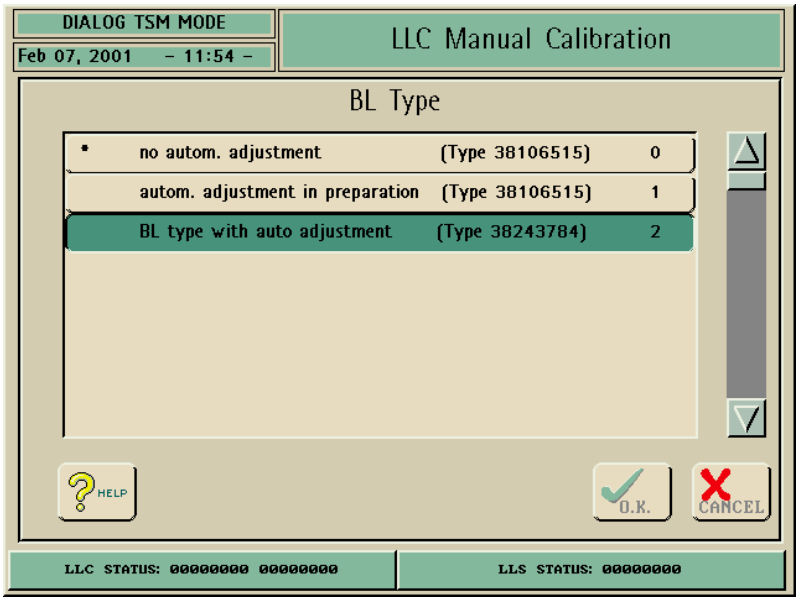
Close front and rear door for the function test and calibration to prevent light irradiation on the sensor.

Leakages

Air and micro-bubbles can lead to false measurement values in the measurement line and can cause fluctuation of the current value.

If air is visible check the complete system for leaks in menu 1.20 Test Water Part. After the initialisation phase rinse the blood leak detector approx. 1 min and then perform a leakage test of the system in menu 1.19 Leak Test.

4.10.4.8.1 Activation Blood Leak Detector Type 2



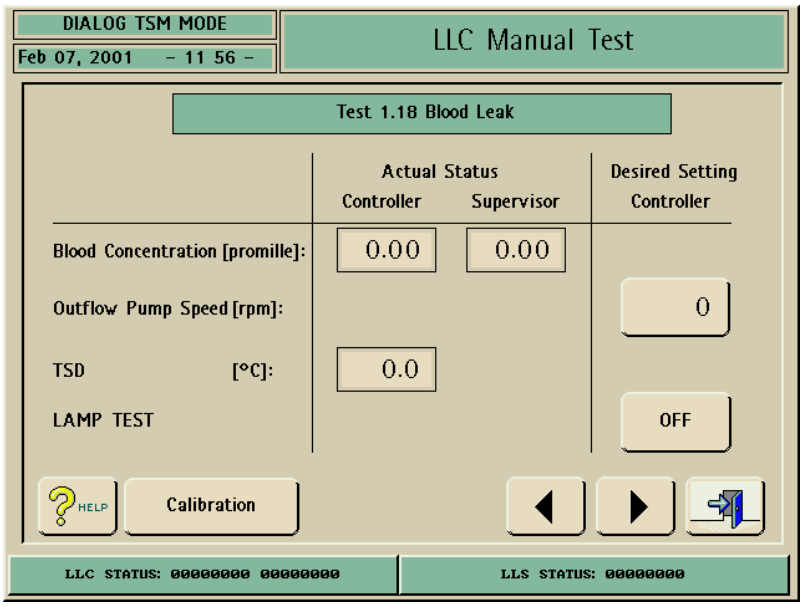
If a blood leak detector type 2 is assembled the setting *BL Type with Auto Adjustment (Type 3824 3784)* must be activated.

A software calibration is not performed in *<Preparation>*.

The blood leak detector type 2 performs an automatic calibration with a reference diode.

1. Select *Manual Test and Calibration*.
2. Select *LLC Manual Calibration*.
3. Select *Calibration 2.7 Blood Leak Detector*.
4. Select *BL Type* icon.
5. Select blood leak detector 2 (type 3824 3784) and press *OK* key. The blood leak detector type 2 is activated.

4.10.4.8.2 Check Blood Leak Detector Type 2



1. Connect both dialyser couplings to the rinsing bridge.
2. Select menu *Test 1.18 Blood Leak* in TSM to perform a function check of the blood leak detector.
3. Rinse the blood leak detector for approx. 1 min at the beginning of the rinsing time with flow pump outlet **FPA** = 2000 min^{-1}. Thereby possible air bubbles in the system are removed.
4. Rinse blood leak detector for approx. 15 to 30 min with **FPA** = 1000 min^{-1} to warm up the complete system to a temperature of approx. 40 ^{o}C.
5. The *LED test* is activated with the *LED TEST OFF* key. The *OFF* key switches to the *RED* key key as soon as the key is pressed.

   The *red LED* is tested after 10 s. The controller value for the switched off *red LED* must be as follows (the supervisor value is uncritical):
   Note: write down value

red LED	Actual Status Controller
Blood Concentration	< 4.00

6. Press the *LED TEST RED* key to switch to the *green LED*. The *RED* key switches to the *GREEN* key.

   The *green LED* is tested. The controller value for the switched off *green LED* must be as follows (the supervisor value is uncritical):
   Note: write down value

green LED	Actual Status Controller
Blood Concentration	> 2.06

7. The actual controller values for the *red LED* and the *green LED* must be divided.

   The calculated value must be in the following limits (to the first decimal digit/round off):

red LED / green LED
1.2 - 1.4

Exchange the blood leak detector type 2 if one of these three values are out of limits.

4.10.4.8.3 Calibration Blood Leak Detector Type 2

Close front and rear door for the calibration to prevent light irradiation on the sensor. Air and micro-bubbles must not be present prior or during the calibration of the blood leak detector (if necessary rinse, see information 4.10.4.7).
The blood leak detector must b clean.
FPA must be switched off to prevent a flow during the calibration procedure.
The calibration of the blood leak detector type 2 is performed in two steps:

- Turbidity calibration
- Calibration with reference solution

You can skip directly to the calibration of the blood leak detector type 2 by pressing the Calibration key.

- Reference Solution (Red Dye, 770 0911)
- Graduated cylinder 2 litre

1. Both dialyser couplings are connected to the rinsing bridge.
2. Prepare reference solution, i.e.:
   Prepare reference solution with 1 ‰ reference solution, e.g. 2 litre water/2 ml reference solution. The water should have at least 30 °C for an accurate calibration. Mix the reference solution thoroughly.

4.10.4.8.3.1 Turbidity Calibration with Water

3. Press Calibration key. The calibration window is opened.
4. Set **FPA** slowly to zero.
5. Press the Calibration key to activate the first calibration point of the automatic calibration.

   The values must be in the following limits:

	Actual Status Controller	Actual Status Supervisor
Blood Concentration [thousandth part ‰]	- 20 to + 20	215 to 222

After the calibration of the first point the second calibration point is automatically displayed.

4.10.4.8.3.2 Calibration with Reference Solution (Red Dye)

6. Carefully pull off red dialyser coupling to prevent any loss of fluid/air-intake.
7. Carefully insert red dialyser coupling into reference solution (loss of fluid/air-intake).

8. Set **FPA** slowly to 1000 min^{-1} and draw-in approx. 1 l reference solution.
9. Set the **FPA** slowly to zero. If the displayed actual blood concentration value of the controller is stable, press the Calibration key to acknowledge.

   The displayed actual blood concentration value must be in the following limit, to ensure a sufficient resolution:

	Actual Status Controller
Blood Concentration [thousandth part ‰]	> 200

10. Acknowledge and store completed calibration procedure with O.K. key.

4.10.4.8.4 Actual Value Check Blood Leak Detector Type 2

11. Select menu 1.18 in TSM to check the actual value of the blood leak detector.

4.10.4.8.4.1 Check 0 ‰ Blood Concentration

12. Connect red dialyser coupling to rinsing bridge.
13. Set **FPA** slowly to 1000 min^{-1} and rinse.
14. Check blood concentration of the controller and supervisor.

    The values for the controller and supervisor must be in the following limits:

	Actual Status Controller	Actual Status Supervisor
Blood Concentration [thousandth part ‰]	0 to 0.2	0 to 0.2

4.10.4.8.4.2 Check 1 ‰ Blood Concentration

15. Set **FPA** slowly to zero.
16. Carefully disconnect red dialyser coupling.
17. Carefully insert red dialyser coupling into reference solution.
18. Set **FPA** slowly to 1000 min^{-1} and draw-in remaining reference solution.
19. Check blood concentration of the controller and supervisor.

    The blood concentration values for the controller and supervisor must be in the following limits:

	Actual Status Controller	Actual Status Supervisor
Blood Concentration [thousandth part ‰]	0.95 to 1.1	0.95 to 1.1

4.10.4.9 Calibration of Flow Rate UFP, BICP and KP

You can calibrate the ultrafiltration pump **UFP**, the bicarbonate pump **BICP** and the concentrate pump **KP**. Prior to calibration the balance chamber initialisation must be completed. The respective pump runs for a predetermined time after pressing the START Calibration key and stops after a certain number of revolutions are reached.

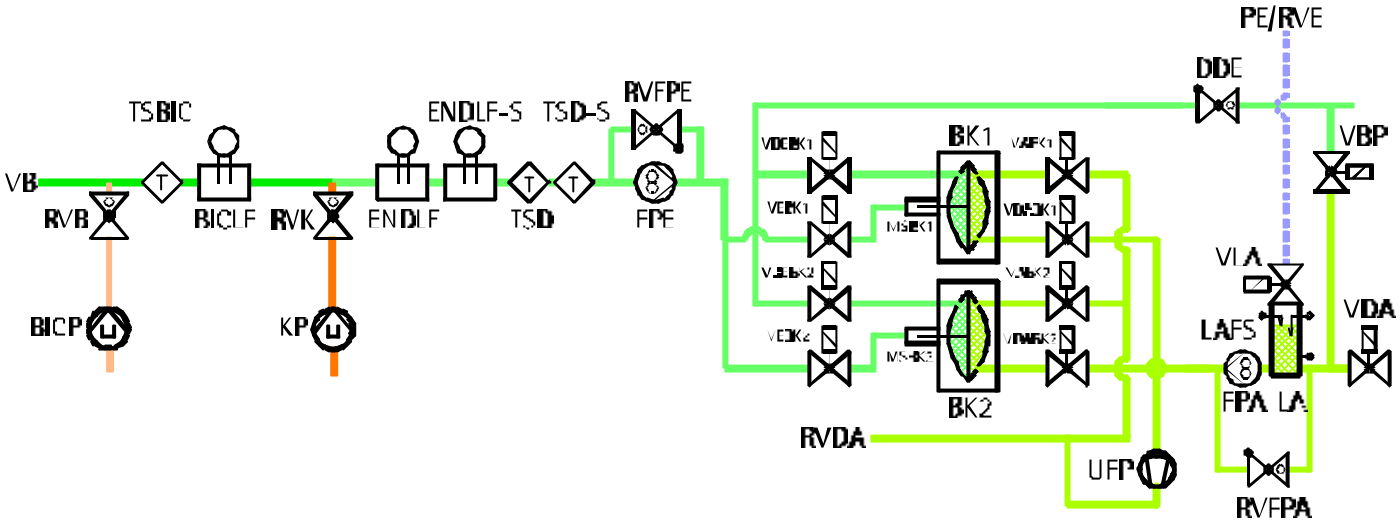
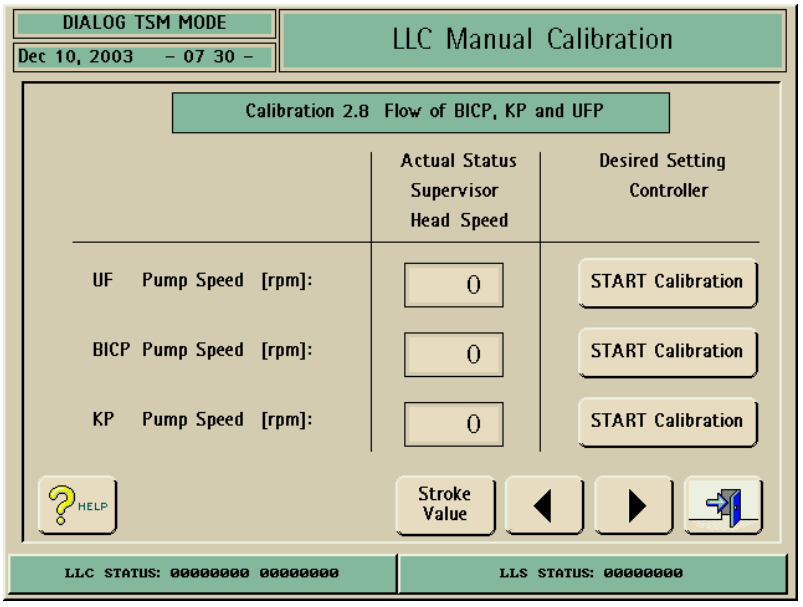


Fig.: Bicarbonate Pump BICP, Concentrate Pump KP and Ultrafiltration Pump UFP



During the selection of the menu:

- the balance chamber is initialised and
- the **UFP** is set to a defined initial position (reed sensor position).

Thus the accuracy during the calibration of **UFP** is improved, because **UFP** runs back to the initial position at the of calibration. Thus complete revolutions are counted.

1. Activate the *LLC Manual Calibration* menu with the *LLC Manual Calibration* key in the *Manual Test and Calibration* menu.
2. Activate the *Flow of BICP, KP and UF Pump* menu by pressing on the line *Calibration 2.8 Flow of BICP, KP and UF Pump*. The following menu is displayed.
3. Press the ◀ or ▶ key to skip to the previous or to the next calibration menu.

4.10.4.9.1 Calibration BICP and KP Pump

Prior to calibration the initialisation of the balance chamber must be completed. The initialisation is completed, if the *LLC Status* window changes from *0 0 0 0 0 0 0 0 4* to *0 0 0 0 0 0 0 0 0* .
The system must be free of air for calibration. Thus an accurate calibration is guaranteed.

- Graduated Cylinder
- Tubing clamp

1. Fill graduated cylinder with 200 ml water.
2. Remove respective concentrate suction rod from rinsing chamber and insert into graduated cylinder.

3. Press the *BICP Pump Speed* or *KP Pump Speed* START Calibration key again to start a pump calibration.
   The piston pump runs 480 revolutions in 2 minutes and stops.
4. Press the Ref.Value key, which appears automatically after 2 minutes.
5. Enter the suction volume (200 ml **-** residual volume) as the reference value.
6. Press Calibration key to acknowledge.
7. Acknowledge and store completed calibration procedure with O.K. key.

4.10.4.9.2 Calibration UF Pump

The accuracy of the UFP calibration is essential for the precise weight reduction of a patient during dialysis.

1. Clamp and remove outlet tubing from **UFP**. Connect a tubing to outlet of **UFP** and insert tubing into graduated cylinder.
2. Press the *UF Pump Speed* START Calibration to get the system free of air and press the STOP Calibration key to stop the **UFP**.
3. Empty graduated cylinder and insert tubing again.
4. Start pump calibration by pressing the *UF Pump Speed* START Calibration key again, after the system is free of air.

   The **UFP** runs 480 revolutions in 2 minutes and stops.
5. Press Ref.Value key, which appears automatically after 2 minutes.
6. Enter the measured delivery volume as reference value.
7. Press Calibration key to acknowledge.
8. Acknowledge and store completed calibration procedure with O.K. key.

4.10.4.9.3 Calibration UF Pump for HDF Bag Option

Piston Pump
A modified piston pump with a stroke volume of approx. 0.3 ml is used for the HDF bag option.

Correction Factor
A correction factor of 0.992 must be used for the precise calculation during calibration. The correction factor is necessary, because water is used instead of ultrafiltrate (different densities). Thus the requested accuracy is guaranteed during calibration.
The counted pump head revolutions are displayed in the *Actual Status* window by the supervisor after the calibration.

- 500 ml graduated cylinder (art. no. 770 2302)
- 1 ml syringe (art. no. 770 2310)
- Tubing clamp

1. Clamp and remove outlet tubing from **UFP**. Connect a tubing to outlet of **UFP** and insert tubing into 500 ml graduated cylinder.

2. Activate calibration menu 2.8 and wait until the initialisation of the balance chamber is completed (dialyser couplings must be connected to the rinsing bridge).

3. Press the *UF Pump Speed* START Calibration key and run the machine for 10 minutes to:
   - get the machine to the operating temperature and
   - get the system free of air.

4. Press STOP Calibration key to stop **UFP**.

5. Empty completely the graduated cylinder and insert tubing again.

6. Press the *UF Pump Speed* START Calibration key to start calibration after the system is free of air.

   The calibration time is selected to deliver approx. 500 ml.

7. Stop calibration procedure with STOP Calibration key when 500 ml mark on the graduated cylinder is reached.
   The machine calculates the elapsed revolutions of the **UFP**.

8. Level to the 500 ml mark on the graduated cylinder with a 1 ml syringe, i.e. either remove or inject with the syringe (document respective volume). Thus the exact delivered volume can be determined.

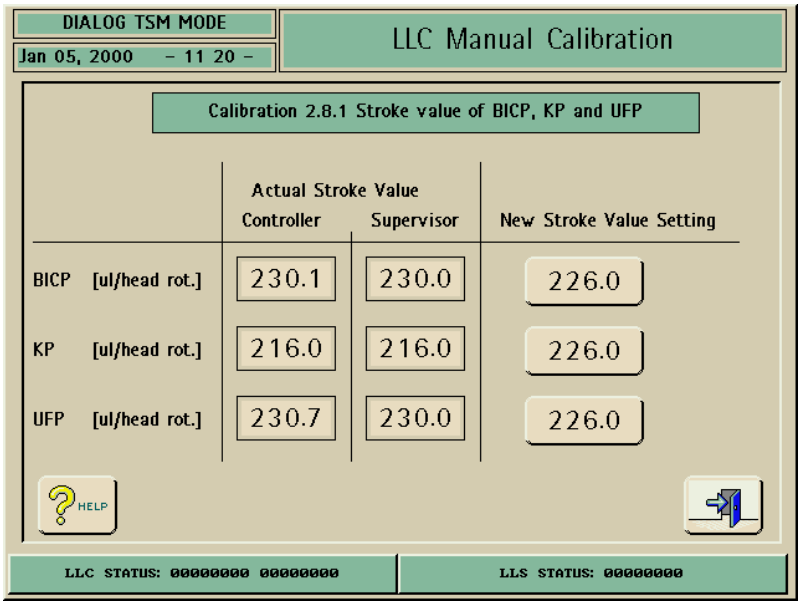
9. The measured volume $V_{measured}$ must be multiplied by the correction factor (0.992). This calculated reference volume V_{ref} must be entered during the calibration procedure.
   $V_{ref} = V_{measured} \times 0.992$

10. Press Calibration key to acknowledge.

11. Acknowledge and store completed calibration procedure with O.K. key.

12. Press Stroke Value key to select the menu *2.8.1 Stroke Value of BICP, KP and UFP*. Compare the calculated stroke values of LLC and LLS. The values must correspond to one decimal place.

4.10.4.9.4 Stroke Value of BICP, KP and UFP



The sub-menu *2.8.1 Stroke Value of BICP, KP and UFP* can be selected with the *Stroke Value UFP* key.

The sub-menu *2.8.1 Stroke Value of BICP, KP and UFP* can be selected from the menus *1.17 UF Pump*, *1.22 HDF* or *2.8 Calibration Flow of BICP, KP and UFP*.

The stroke values (µl/head rotation) can be entered directly if the exact values are known for the bicarbonate pump *BICP*, concentrate pump *KP* and ultrafiltration pump *UFP*.

4.10.4.10 Calibration Safety Air Detector SAD Version 2

Calibration Level

The value for the calibration level ist marked on the SAD (example calibration level KS = 48) and was determined individually for every SAD ex works.

Test Level

The test level is the value used to check the function of the SAD in the cyclic selftest. The test level is 5 digits higher than the calibration level:

- Test level TS = Calibration Level KS + 5 Digits

Alarm Level

The safety air detector SAD version 2 has a fixed alarm level. The alarm level is displayed after the test level is entered:

- Software < 6.21 = 10 Digits
- Software ≥ 6.21 = 15 Digits

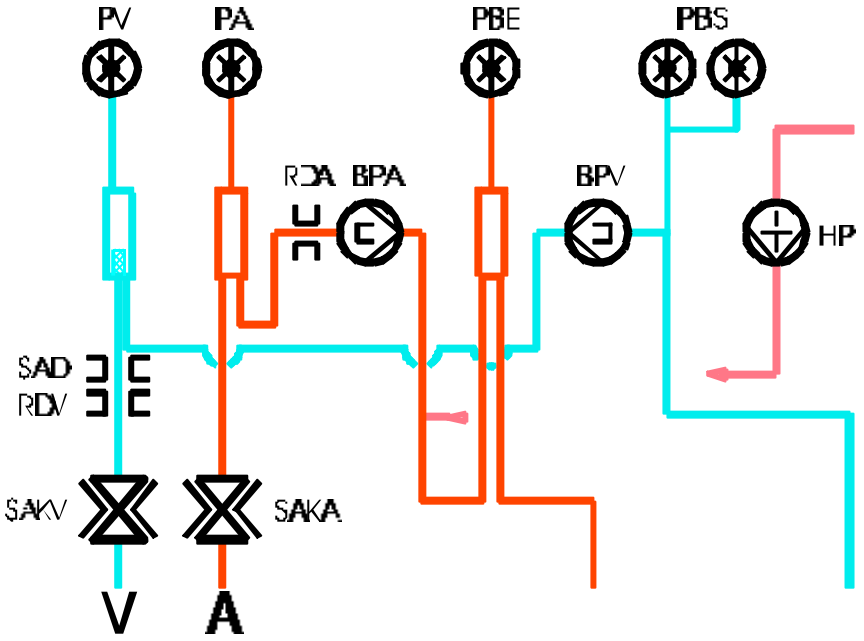
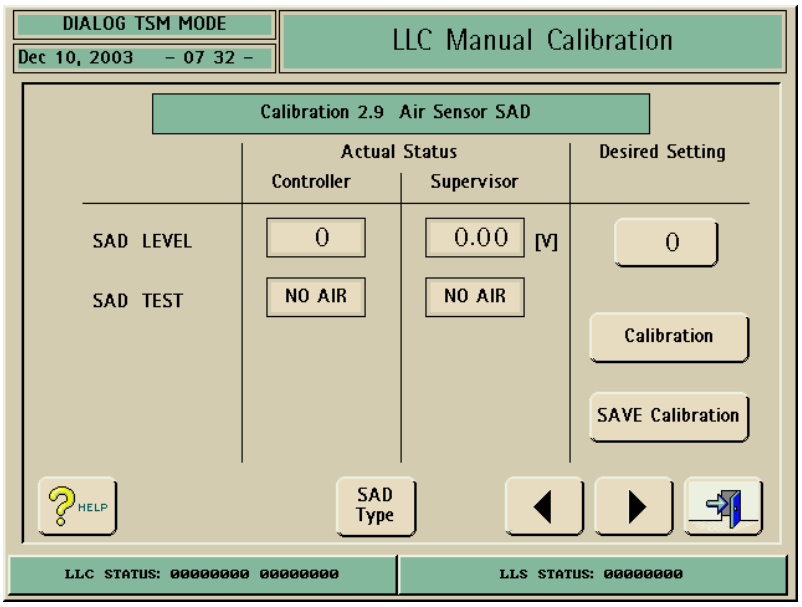


Fig. : Single Needle Version

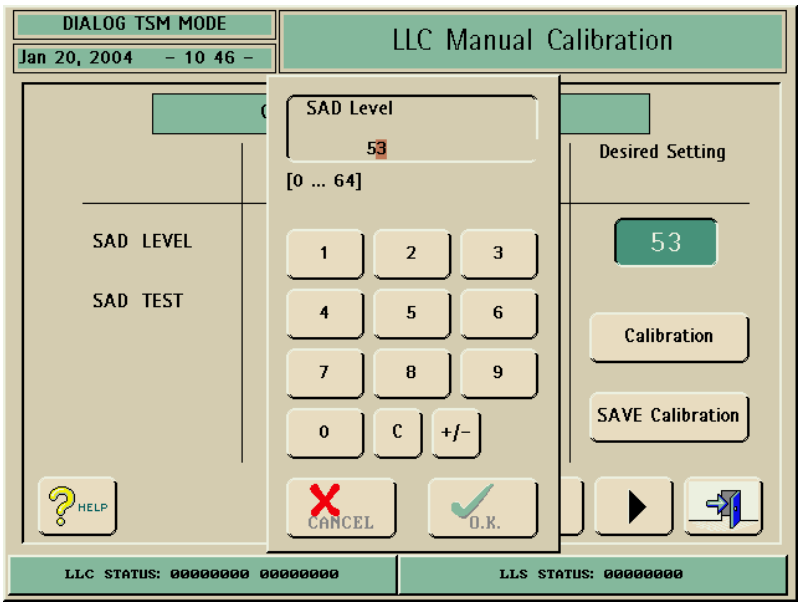


1. Activate the *LLC Manual Calibration* menu with the *LLC Manual Calibration* key in the *Manual Test and Calibration* menu.
2. Activate the *Safety Air Detector SAD* menu by pressing on the line *Calibration 2.9 Safety Air Detector SAD*. The following menu is displayed.
3. Press the ◀ or ▶ key to skip to the previous or to the next calibration menu.

The value for the calibration level ist marked on the SAD (example calibration level KS = 48).

The test level is calculated by adding 5 digits to the calibration level:

- Test level TS = Calibration Level KS + 5 Digits



1. Take the value for the calibration level (KS) on the SAD and enter the value in the *Desired Setting* window. 5 digits are automatically added by the software:
   Example: Test level TS = 48 + 5 = 53
2. Press Calibration key and wait until the Calibration key switches back again.
   The calibration procedure is completed.
3. Press the SAVE Calibration key to store the calibration data in the E^2PROM.

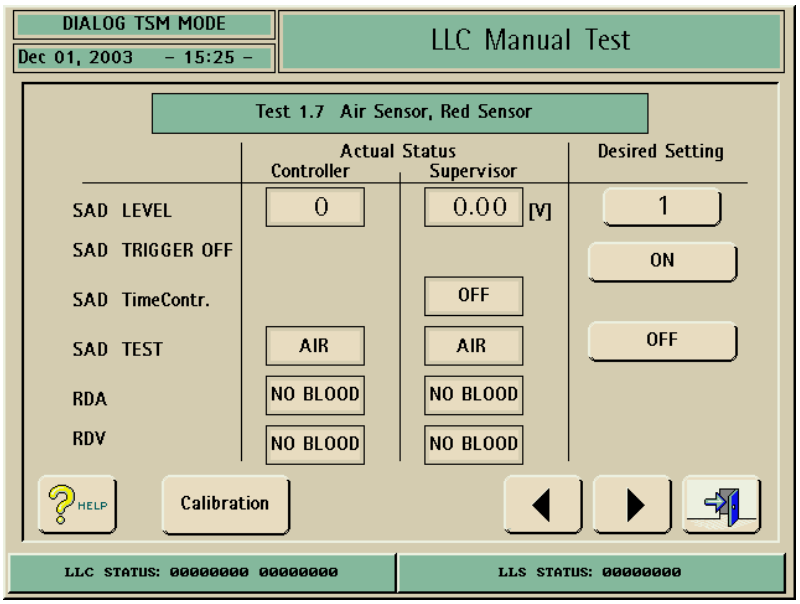
4.10.4.10.1 SAD Test after Calibration

SAD Test

AIR must be detected if the *SAD TEST* is activated. The sensitivity can be changed to check the switching point.

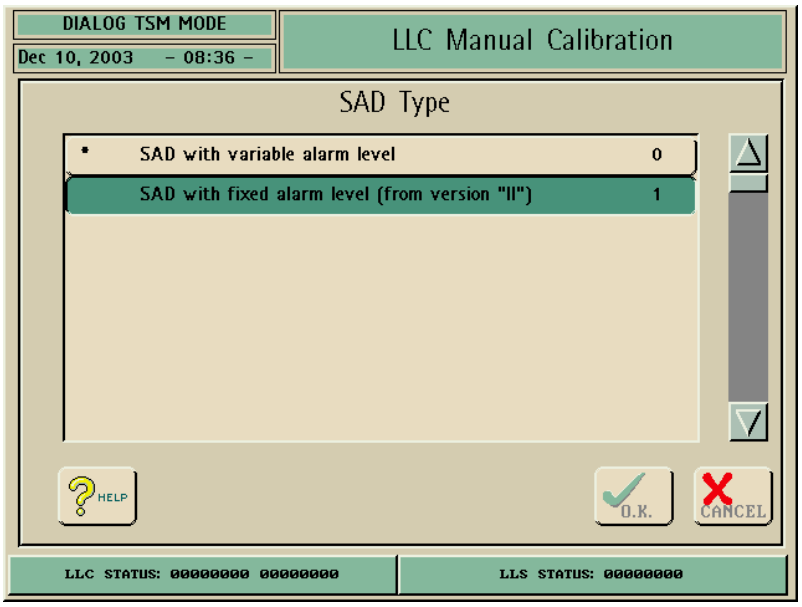
AIR: must be detected if a tubing filled with air is inserted.

NO AIR: must be detected if a tubing filled with fluid is inserted.



1. Activate the menu *Test 1.7 Air Sensor, Red Sensor* in the *LLC Manual Test* menu.
2. Insert a tubing filled with air in the SAD and close cover.
3. Enter 1 digit in the *Desired Setting* window (*SAD Level*). The controller and supervisor must display: *SAD TEST = AIR*.
4. *Desired Setting* window (*SAD TEST*): set to *TEST* (KS+5 digits) and insert a tubing filled with liquide and check *Actual Status* display:
   Controller: *AIR*
   Supervisor: *AIR*
5. *Desired Setting* window (*SAD Trigger OFF*): set to *OFF* and check *Actual Status* display:
   Supervisor: must change to *ON*

4.10.4.10.2 Selection SAD Version 2



1. Activate the menus *Calibration 2.9 Safety Air Detector SAD*, *SAD Type*.
2. Activate *SAD with Fixed Alarm Level (from Version 2)*.

Note
If the safety air detector version 1 is present:

- If the SAD version 1 is defective replace with SAD version 2.

4.10.4.11 Calibration BICLF and ENDLF Ratio

You can set the limit values for the **BICLF** and **ENDLF** ratio. The ratio between bicarbonate (acid), acetate concentrate and water (e.g. osmosis water) is monitored, during dialysis. Thus dialysis is monitored to prevent the use of false concentrates.

All concentrates applied by the user must be checked, during commissioning. If necessary the limit ratio value for bicarbonate and acid/acetate respectively, must be adapted to each machine to meet the customer specific requirements.

ENDLF Ratio for Acid Concentrate with Ratio 1:44

The **ENDLF ratio** should be set to 45 if an acid concentrate is used with a ratio of 1:44.

The acetate dialysis should be disabled, because an acetate dialysis is not possible with this setting: *Treatment Support*, *System Configuration, Dialysate Side Parameters, Acetate Mode Disabled (YES)*

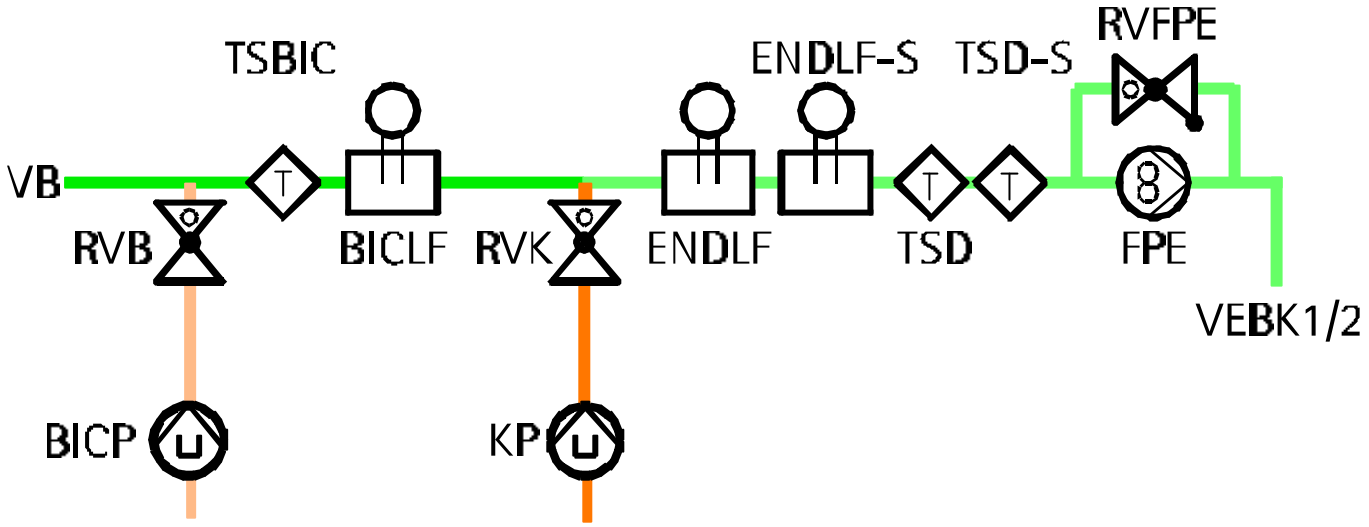
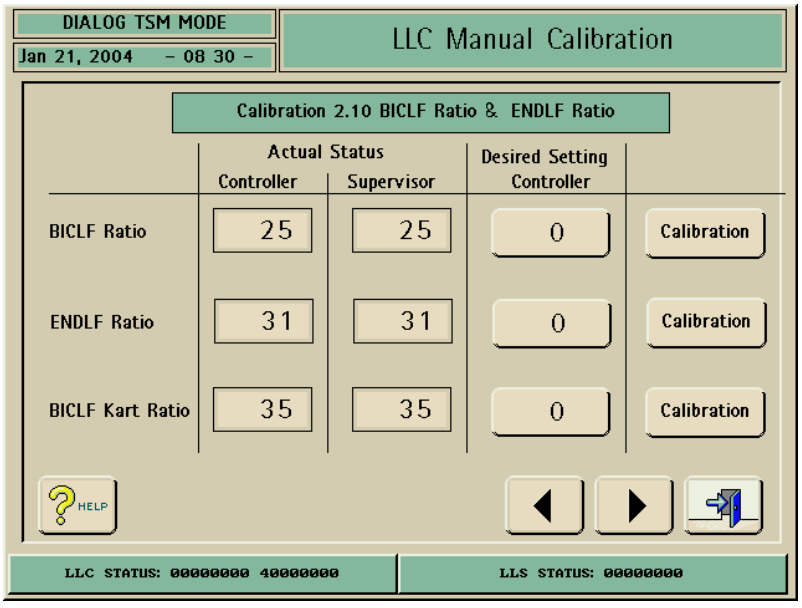


Fig.: BICLF and ENDLF Conductivity Sensors



1. Activate the *LLC Manual Calibration* menu with the *LLC Manual Calibration* key in the *Manual Test and Calibration* menu.
2. Activate the *BICLF and ENDLF Ratio* menu by pressing on the line *Calibration 2.10 BICLF and ENDLF Ratio*. The following menu is displayed.
3. Press the or key to skip to the previous or to the next calibration menu.

The *BICLF Cart Ratio* is only displayed if the bicarbonate cartridge holder option is activated in the *Production Report*, *LLC Options*, *Holder for BIC Cartridge*.

You can determine the limit of the **ENDLF ratio** (measured at the end conductivity sensor **ENDLF**).

Ratio Values (Factory Settings)

BICLF Ratio: 25 (ratio water/bicarbonate for canister operation)
ENDLF Ratio: 31 (bicarbonate mode=ratio water/acid)
(acetate mode=ratio water/acetate)
BIC Cart Ratio: 35 (ratio water/bicarbonate for cartridge operation)

Bicarbonate Therapy

The **ENDLF ratio** limit value 31 (factory setting, can be modified) must not be exceeded. An alarm is activated if this **ENDLF ratio** limit is exceeded.

Bicarbonate Mode		
Upper Limit ENDLF Ratio:	< 31	
Default Value BICLF Ration:	25 ± 7 (canister)	
Default Value BICLF Ration:	25 ± 10 (cartridge)	
	Setting Range (ENDLF Ratio 14 mS/cm)	**Setting Range (BICLF Ratio 3 mS/cm)**
Acid	10 to 50	-
Bicarbonate	-	10 to 50 (canister) 25 to 50 (cartridge)
Concentrate Pump **KP**:	Suction Rod (red)	
Bicarbonate Pump **BICP**:	Suction Rod (blue)	

Acetate Therapy

The **ENDLF ratio** limit value must not fall below 31 (factory setting, can be modified). An alarm is activated if this **ENDLF ratio** limit is lower than 31.

Acetate Mode		
Lower Limit ENDLF RATIO:	> 31	
	Setting Range (ENDLF Ratio 14 mS/cm)	**Setting Range (BICLF Ratio 3 mS/cm)**
Acetate	10 to 50	-
Concentrate Pump **KP**:	Suction Rod (red)	
Bicarbonate Pump BICP: **BICP**:	is deactivated in acetate mode	

The **BICLF Ratio** and **ENDLF ratio** limits can be modified in the given limits. These limits were determined and set to meet the general requirements. The Dialog is delivered with a standard factory setting. Concentrates, which are individually composed and applied in dialysis centres, can differ from these standard values.

The **BICLF/ENDLF ratio** value can differ from Dialog to Dialog (deviations approx. 10 %). These deviations are conditioned by the system and are caused by the volume measurement of the balance chamber system (membrane position sensors **MSBK1/2**). This deviation is not valid for a single machine.

If necessary slightly tap the conductivity sensors during calibration to prevent air bubbles to adhere to the sensors.

The delivery rates of **KP** and **BICP** must be calibrated correctly.

1. Check Bicarbonate

Check the conductivity of all concentrates in the therapy main menu, according to the prerequisites of the customer (setting of **ENDLF ratio** and **BICLF ratio**). If necessary change **END/BICLF ratio**.

- **BICLF ratio** default value 25 ± 7
- **ENDLF ratio** limit value < 31

Connect the suction rod correctly!

Operating Mode: Bicarbonate

- red suction rod for acid concentrates
- blue suction rod for bicarbonate

1. Select the *Haemodialysis* key in *Therapy Selection*. Machine switches to *Preparation*.
2. Select the *Parameter* key, a parameter window is opened.
3. Select *Bicarbonate* key and activate bicarbonate mode.
4. Connect the respective concentrate (bicarbonate/acid) after the request.

   Note
   After water side selftest approx. 10 minutes.
5. Select service overview to display the current RATIO values. Wait till stable ratio values are reached. Use the mean value if there are slight deviations.
6. Connect and check all concentrates in succession and note the **BICLF ratio** and **ENDLF ratio** values.
7. Switch off the Dialog and set switch K1 to *position 2* TSM service program.
8. Switch on Dialog.
9. Select the *Manual Test & Calibration* key.
10. Select *LLC Manual Calibration* key and activate *2.10 BICLF Ratio & ENDLF Ratio*.

For bicarbonate therapy with **BICLF ratio** values near the limits or out of the default setting of 25 ±7.

11. If necessary enter the value for **BICLF ratio** (mean value of all bicarbonates) in *BICLF Ratio Desired Setting Controller 25* key (default value 25).
12. Acknowledge and save the entered value with the *Calibration* key.
13. Select *Treatment Support* key.
14. Select *System Configuration* key and activate the *Dialysate Side Parameters* key.

The set **ENDLF ratio** limit should be between the bicarbonate and acetate mode. Change the set point range accordingly for acid **ENDLF ratio** > 31 or acetate **ENDLF ratio** < 31.

15. If necessary select *ENDLF ratio Limit XX* key (limit Value 31) and enter the value for the **ENDLF ratio** (mean value for all concentrates).
16. Save the entered limit value.
17. Switch off Dialog and set switch K1 to *position 0* therapy.

2. Check Acetate

Check the conductivity of the acetate in the therapy main menu, according to the prerequisites of the customer (setting of **ENDLF ratio**) and check whether the **ENDLF ratio** for bicarbonate (31) are in the limits. Thus a change between bicarbonate and acetate is possible, without changing the **ENDLF ratio** value when changing from bicarbonate to acetate.

- **ENDLF ratio** limit value > 31

Connect the suction rod correctly!

Operating Mode: Acetate

- red suction rod for acetate

1. Select the *Haemodialysis* key in *Therapy Selection*. Machine switches to *Preparation*.
2. Select the *Parameter* key. A parameter window is opened.
3. Select *Bicarbonate* key and activate acetate mode.
4. Connect the respective acetate after the request.
5. Select service overview to display *END-RATIO*. Wait till a stable **ENDLF ratio** value is reached. Use the mean value if there are slight deviations.
6. Note all **ENDLF ratio** values of different concentrates.
7. Switch off the Dialog and set switch K1 to *position 2* TSM service program.
8. Switch on Dialog.
9. Select *Treatment Support* key.
10. Select *System Configuration* key and activate the *Dialysate Side Parameters* key.

The set **ENDLF ratio** limit should be between the bicarbonate and acetate mode. Change the set point range accordingly for acetate **ENDLF ratio** < 31 or acid **ENDLF ratio** > 31.

11. If necessary select *ENDLF ratio Limit XX* key (limit Value 31) and enter the value for the **ENDLF ratio**.
12. Save the entered limit value.
13. Switch off Dialog and set switch K1 to *position 0* therapy.

3. Bicarbonate Cartridge Holder Option

The option must be activated, set and checked in the TSM service program. After the activation a ratio value must be set for the *BICLF Cart Ratio*. Check the ratio value in therapy (service overview) and adjust if necessary.

Setting Range: 25 to 50

Limits: Setting ± 10

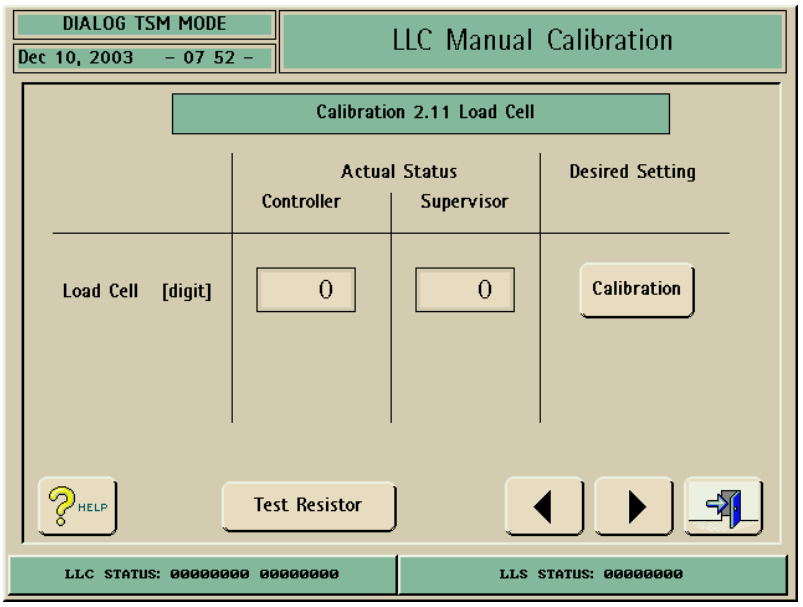
1. Enter 35 in *Desired Setting Controller* for the *BICLF Cart Ratio*.
2. Save the entered value with the *Calibration* key.
3. Check the bicarbonate ratio value in therapy.

4.10.4.12 Calibration Load Cell

You can calibrate the load cell for the HDF bag option. The load cell is calibrated in two steps. The first calibration step is performed without a weight, the second calibration step with a 10 kg calibration weight. The system is protected against over or under calibration. The result of the calibration can be tested in menu *1.22 HDF*.

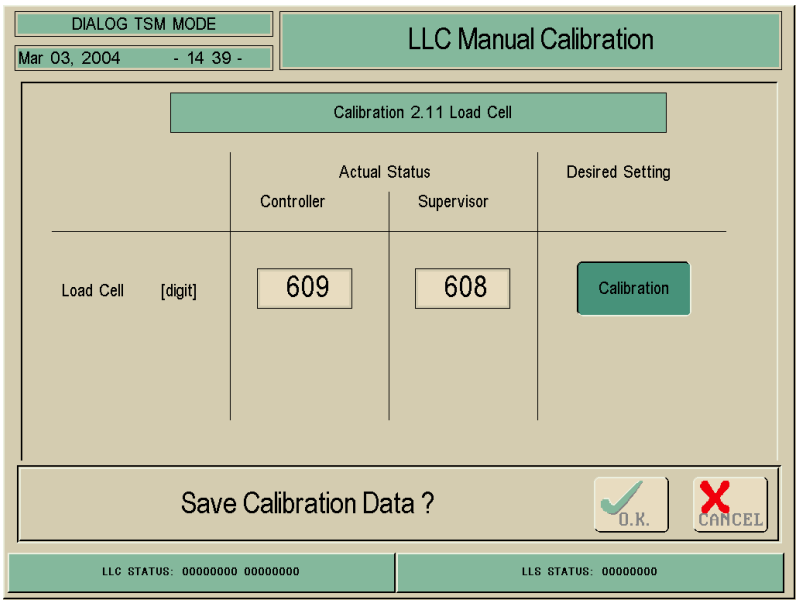
Wait until machine has reached operating temperature.
The HDF arm must be in the upper end position during calibration.

- Calibration Weight 10 kg (770 1713)

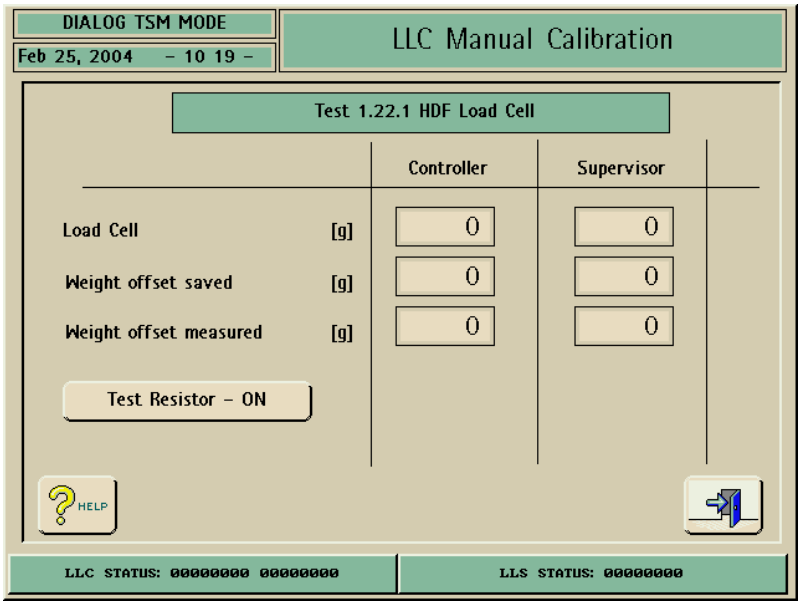


1. Activate the *LLC Manual Calibration* menu with the *LLC Manual Calibration* key in the *Manual Test and Calibration* menu.
2. Activate the *Laod Cell* menu by pressing on the line *Calibration 2.11 Load Cell*. The following menu is displayed.
3. Press the ◀ or ▶ key to skip to the previous or to the next calibration menu.
4. Drive the HDF arm to upper end position.
5. Press *Load Cell* Calibration key.
6. Press lower Calibration key to start calibration The zero point (0 g) is calibrated and then automatically switched to the second calibration point.
7. Hang the calibration weight on the HDF arm of the load cell.
8. Press Ref.Value key and enter the weight marked on the calibration weight.
9. Start with Calibration key. The second calibration point is automatically calibrated.

An automatic calibration of the weight offset with the new calibration data is performed with the test resistor after pressing the O.K. key (*Save Calibration Data?*).
Check the accuracy of the load cell (*Manual Test and Calibration*, *LLC Manual Test*, *Test 1.22 HDF*, *Test 1.22.1 HDF Load Cell*).



10. Acknowledge and store completed calibration (*Save Calibration Data?*) with O.K. key.



11. Press Test Resistor key to change to the menu Test 1.22.1 HDF load cell.

Load Cell

12. Check the calibration weight displayed in the *Controller* and *Supervisor* window.

Test Resistor ON/OFF

Note

It is not important that a calibration weight is hanged on the load cell. It is important that the load cell is steady during the test.

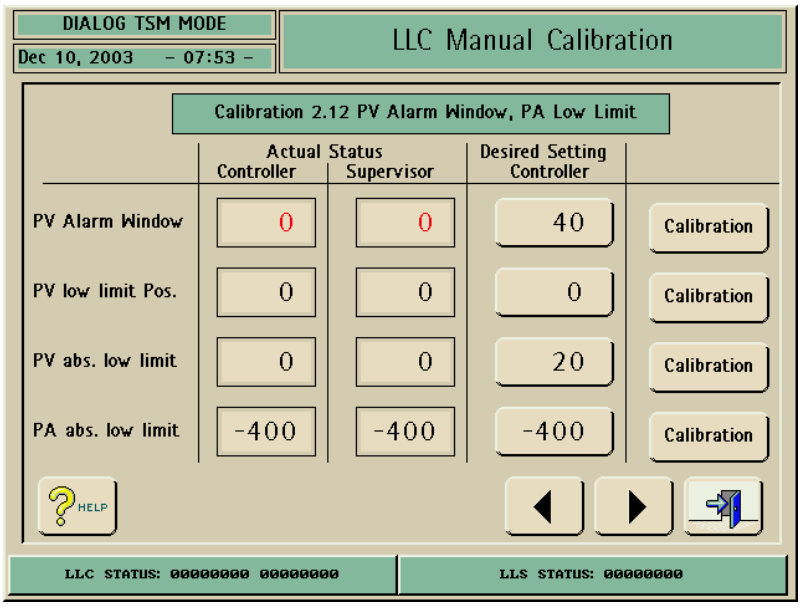
13. Press Test Resistor - ON key (key switches to Test Resistor - OFF):

    Thus the following is checked:

    - relay switches and
    - the *Weight Offset Saved* and the *Weight Offset Measured* approx. correspond (approx. 2.6 kg in the display for the *Controller* and *Supervisor*).

14. Remove calibration weight from HDF arm.

4.10.4.13 Calibration PV Alarm Window



1. Activate the *LLC Manual Calibration* menu with the *LLC Manual Calibration* key in the *Manual Test and Calibration* menu.
2. Activate the *PV Alarm Window* menu by pressing on the line *Calibration 2.12 PV Alarm Window*. The following menu is displayed.
3. Press the or key to skip to the previous or to the next calibration menu.

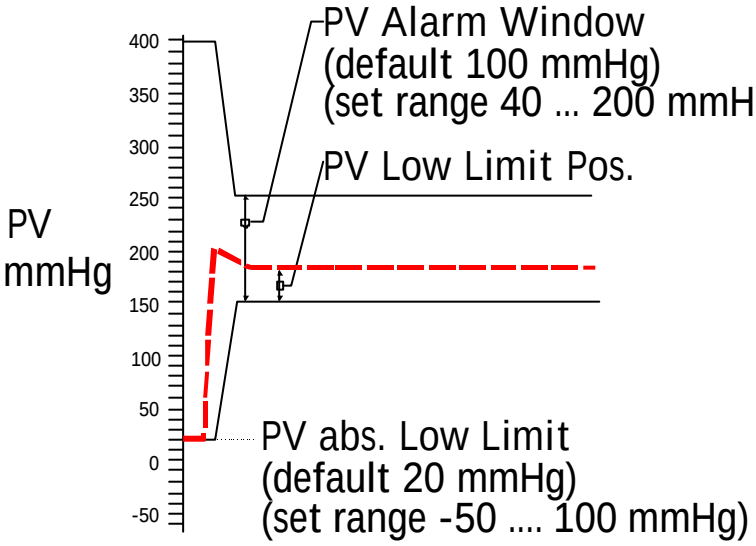


Fig.: PV Settings

PV Alarm Window

You can set the window values for the alarm limits of the **PV** monitoring for therapy.

PV Low Limit Position

You can set the low limit position and window values for the alarm limits of the **PV** monitoring for therapy.

PV Absolute Low Limit

If the setting values are changed these must be in agreement with the user, because the lower limit value can be used as a possible indication for "bleeding" (e.g. if the venous access to the patient is disconnected). Furthermore please note that the LLS limit value is 10 mmHg under the *PV Abs. Low Limit* (protection system).

You can set the absolute low limit for **PV** and the window values for the alarm size and position of the **PV** monitoring for therapy.

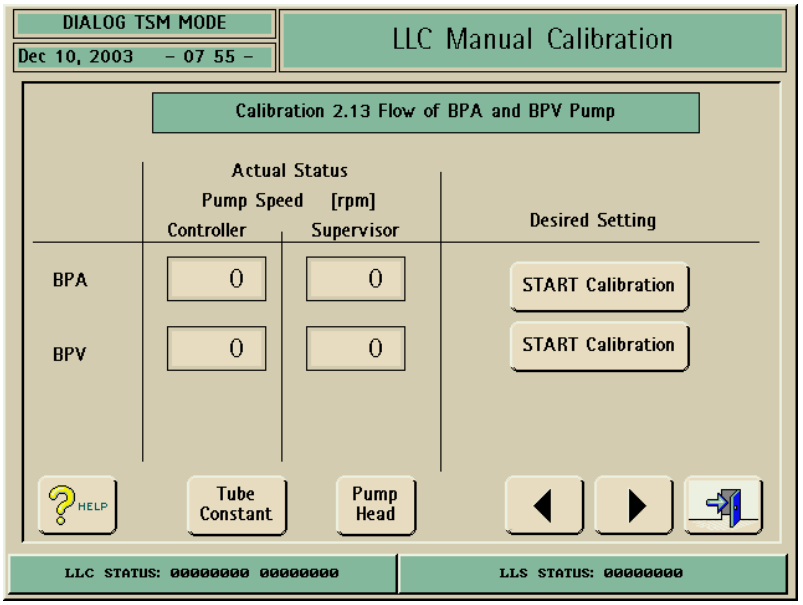
The supervisor uses a tolerance of 10 mmHg for monitoring the **PV** limit values to prevent double alarms.

PA Absolute Low Limit

The set *PA Absolute Low Limit* value (-10 mmHg) is used as limit in therapy and TSM service program/system configuration.

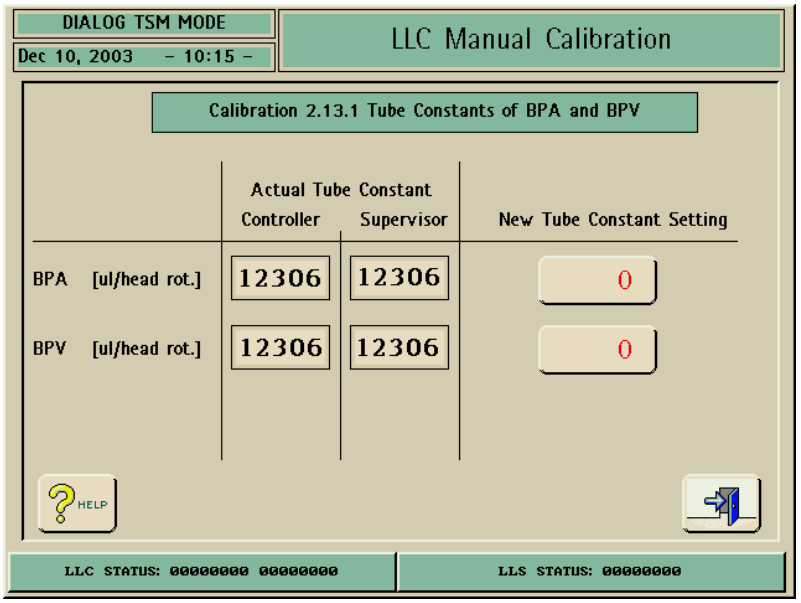
4.10.4.14 Calibration Flow Rate of BPA and BPV/OSP

The tube constants can be directly entered or calculated via a comparison measurement. **BPA** and **BPV/OSP** (option HDF online substitution pump) can be activated with the *START Calibration* key. The delivered volume is measured in ml and entered as reference value. The pressure conditions for the tube system during measurement must be identical with the pressure conditions in therapy.



1. Activate the *LLC Manual Calibration* menu with the *LLC Manual Calibration* key in the *Manual Test and Calibration* menu.
2. Activate the *Flow of BPA and BPV/OSP* menu by pressing on the line *Calibration 2.13 Flow of BPA and BPV/OSP*. The following menu is displayed.
3. Press the or key to skip to the previous or to the next calibration menu.

Tube Constant



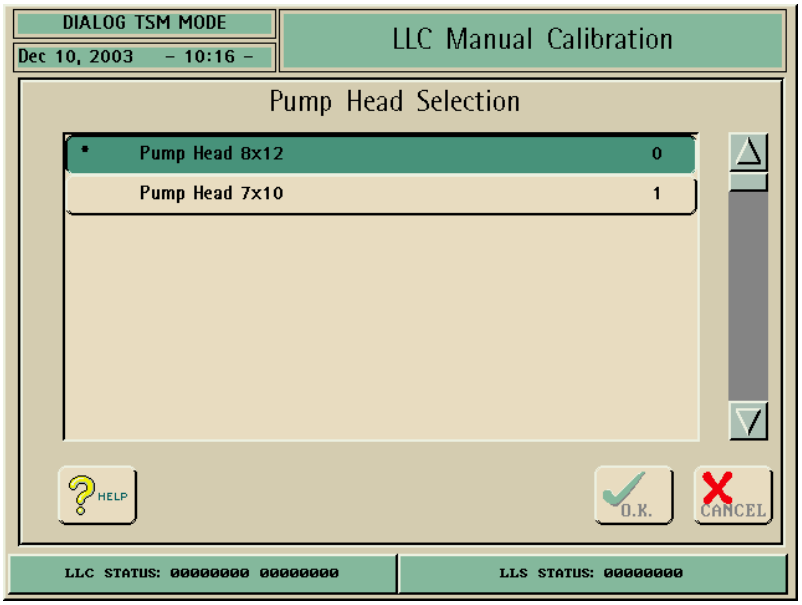
1. Press the *Tube Constant* key to activate the menu *Calibration 2.13.1 Tube Constants of BPA and BPV*. The following menu is displayed.

The following tube constants must be entered for the applied tubing system.

8 x 12 Tubing System

BPA: 12306 µl/Head rotation
BPV: 12306 µl/Head rotation

Pump Head

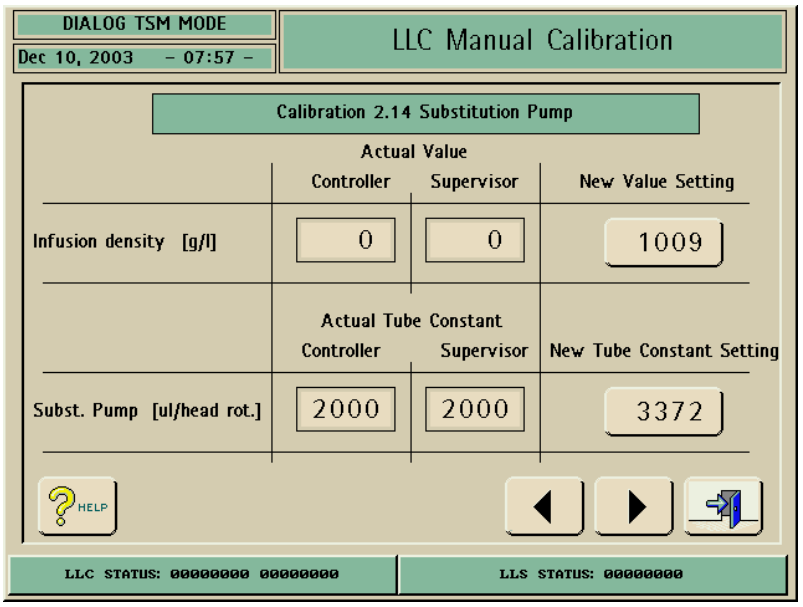


1. Press the *Pump Head* key to activate the menu *Pump Head Selection*. The following menu is displayed.

You can select the pump head roller typ used in the blood pumps.

- Pump head 8 x 12
- Pump head 7 x 10 (option)

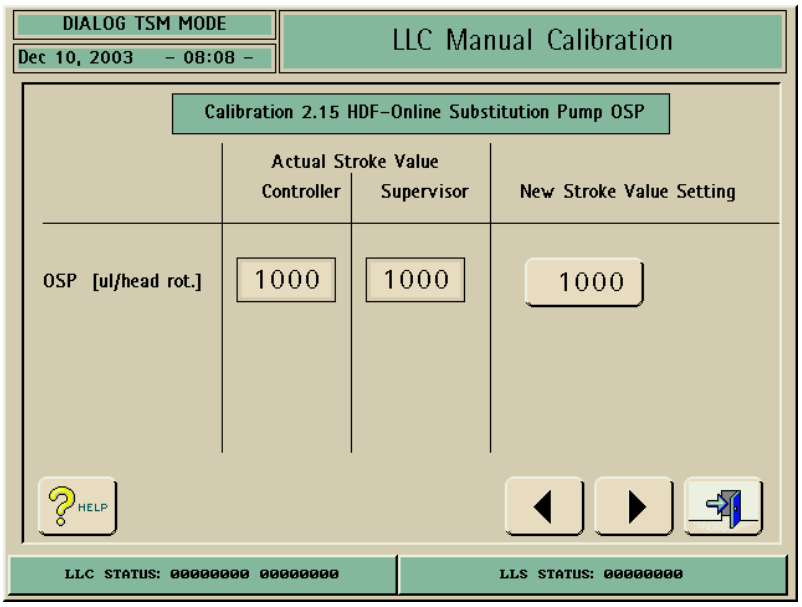
4.10.4.15 Infusion Density Substitution Pump



1. Activate the *LLC Manual Calibration* menu with the *LLC Manual Calibration* key in the *Manual Test and Calibration* menu.
2. Activate the *Substitution Pump* menu by pressing on the line *Calibration 2.14 Substitution Pump*. The following menu is displayed.
3. Press the or key to skip to the previous or to the next calibration menu.

Infusion Density [g/l]	The value for the infusion density must be set to 1006.
Substitution Pump [µl/Head Rotation]	The value for the tube constant must be set to 3372 (for pump head 8 x 12).

4.10.4.16 Stroke Value HDF Online Substitution Pump OSP



1. Activate the *LLC Manual Calibration* menu with the *LLC Manual Calibration* key in the *Manual Test and Calibration* menu.
2. Activate the *HDF Online Substitution Pump OSP* menu by pressing on the line *Calibration 2.15 HDF Online Substitution Pump OSP*. The following menu is displayed.
3. Press the or key to skip to the previous or to the next calibration menu.

Stroke Value HDF Online Substitution Pump OSP

The stroke value must be set to 8300 (for pump head 8 x 12).

Note

The displayed values for the controller and supervisor can differ, because both systems have different resolutions.

4.10.4.17 Calibration Inlet Flow Pump Nonreturn Valve RVFPE

You can calibrate the inlet flow pump nonreturn valve **RVFPE**.

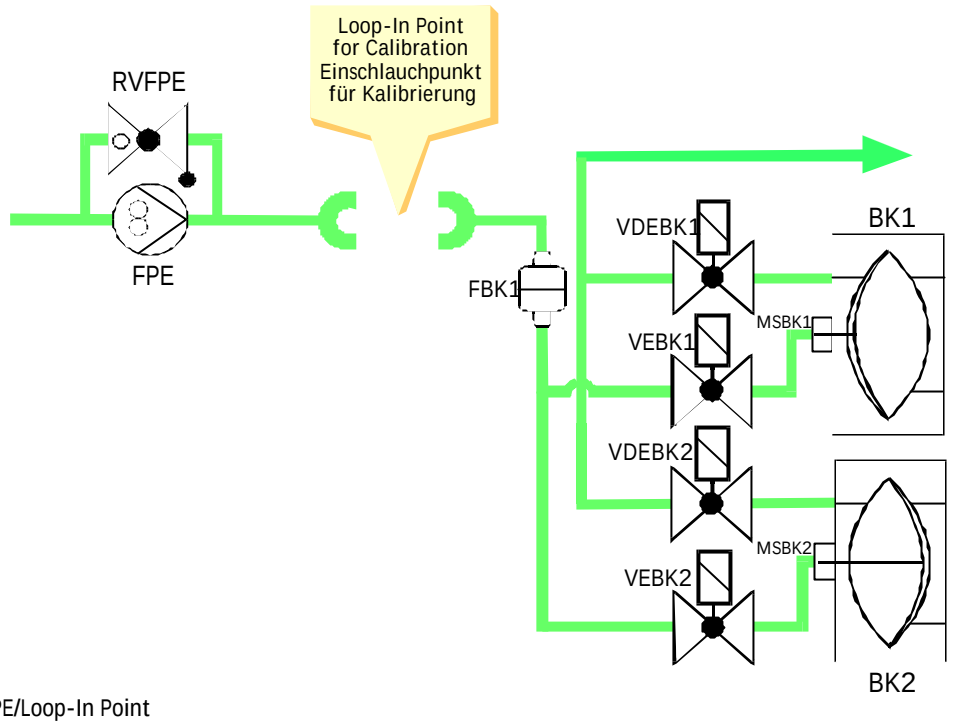


Fig.: Calibration RVFPE/Loop-In Point

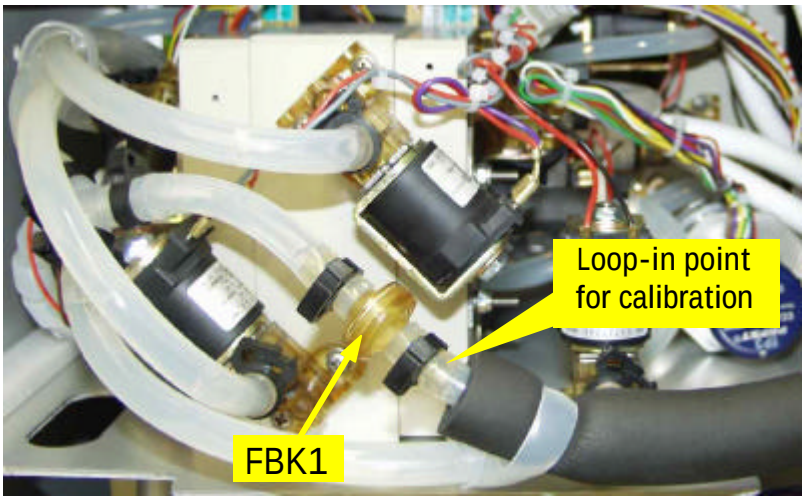


Fig.: UF Sub-Rack with FBK1 (Dialog Advanced)

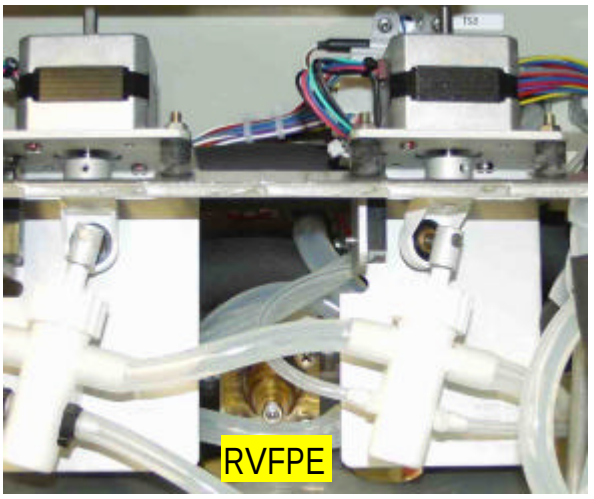


Fig.: DF Sub-Rack with RVFPE (Dialog Advanced)

- Manometer 0 to 4 bar (770 1357)
- Flow meter (770 0857)
- Allen key 3 mm
- Size 7 spanner

Please ensure that the manometer and connection tubing are at the same level as the nonreturn valve during calibration.

1. Connect manometer and flowmeter between flow pump **FPE** and balance chamber.
   Note
   There still can be calibration couplings (KK1/2/3/4) in Dialog machines. These are obsolete since the Dialog Advanced, i.e. if there are leakage problems disassemble the couplings and conncet the tubing directly.
2. Select *Test 1.20 Water Part (Overview)* in TSM.
3. Set speed of flow pump **FPA** to 500 ml/min.
4. Set temperature **TSD** to 37 °C.

5. Clamp tubing between manometer and balance chamber (from **FPE**).
6. Loosen lock nut on **RVFPE** adjustment screw.
7. Set a pressure of 975 mmHg (1300 mbar) with the adjustment screw of **RVFPE**.
8. Tighten lock nut again.
9. Remove manometer and flow meter.

4.10.4.18 Calibration Dialysate Nonreturn Valve RVDA

You can calibrate the dialysate nonreturn valve **RVDA**.

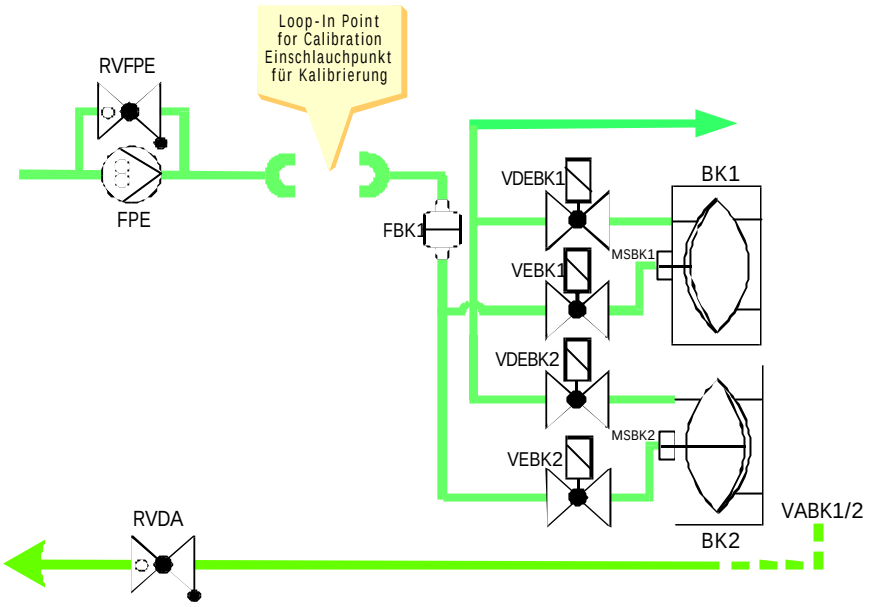


Fig.: Calibration RVDA/Loop-In Point

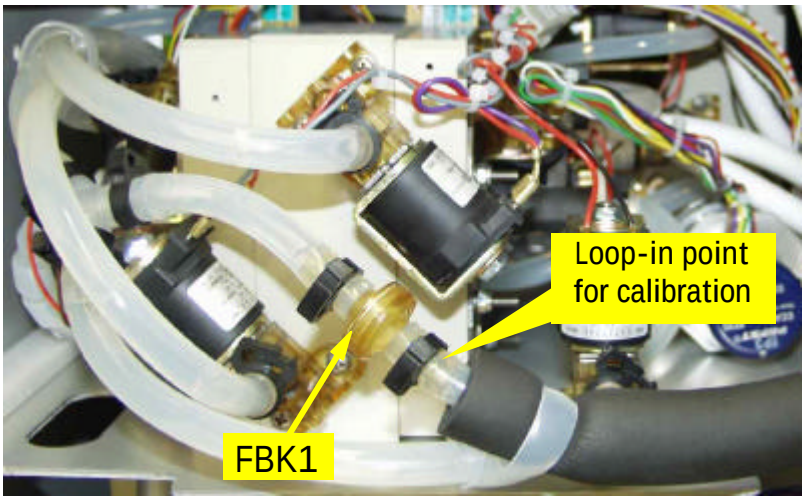


Fig.: UF Sub-Rack with FBK1 (Dialog Advanced)

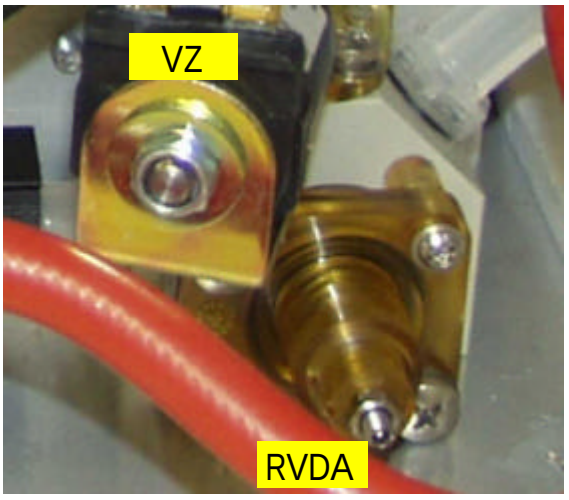


Fig.: Water Inlet Sub-Rack with RVDA (Dialog Advanced)

- Manometer 0 to 4 bar (770 1357)
- Flow meter (770 0857)
- Allen key 3 mm

Please ensure that the manometer and connection tubing are at the same level as the balance chamber/rinsing bridge and dialyser during calibration.

1. Remove lower front cover.
2. Connect manometer and flowmeter between flow pump **FPE** and balance chamber (**FBK1**).
3. Select *Test 1.20 Water Part (Overview)* in TSM.
4. Set speed of flow pump **FPA** to 500 ml/min.
5. Set temperature **TSD** to 37 °C.
6. Loosen lock nut on **RVDA** adjustment screw.
7. Set a pressure of 300 mmHg/400 mbar (HDF online 375 mmHg/500 mbar) with the adjustment screw of **RVDA**.
8. Tighten lock nut again.
9. Remove manometer and flow meter.

4.10.4.19 Calibration Outlet Flow Pump Nonreturn Valve RVFPA

You can calibrate the outlet flow pump nonreturn valve **RVFPA**.

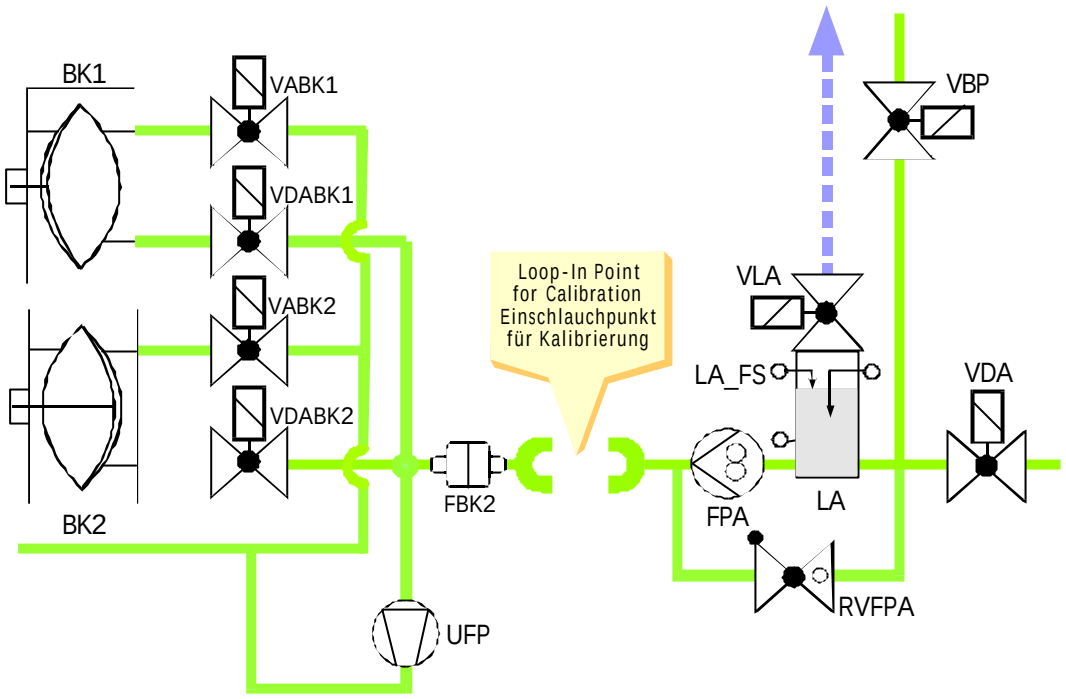


Fig.: Calibration RVFPA/Loop-In Point

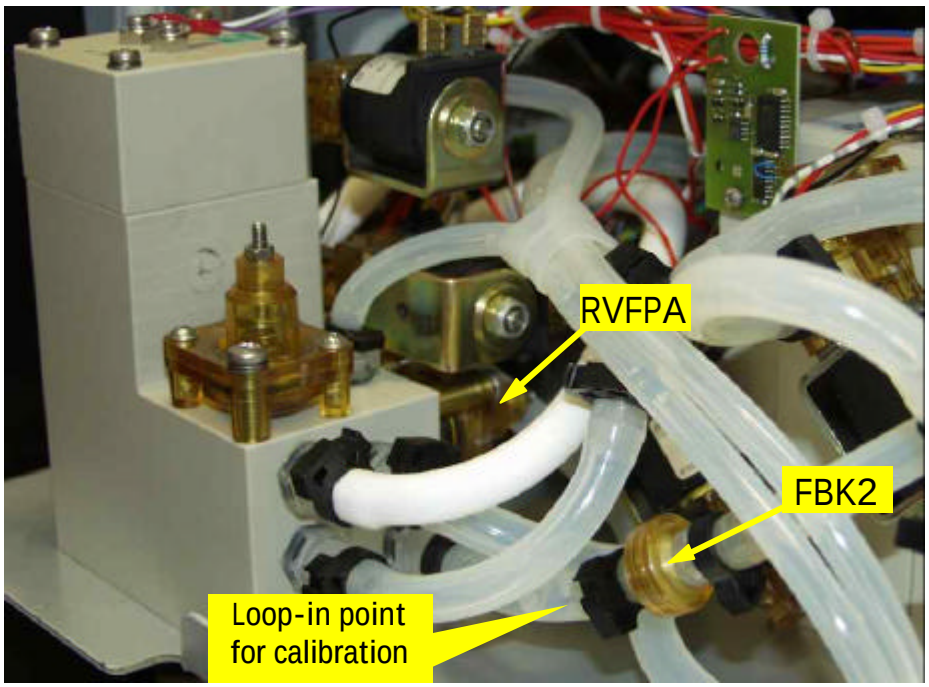


Fig.: UF Sub-Rack with RVFPA (Dialog Advanced)

- Manometer 0 to 4 bar (770 1357)
- Flow meter (770 0857)
- Allen key 3 mm
- Size 7 spanner

Please ensure that the manometer and connection tubing are at the same level as the nonreturn valve during calibration.

1. Connect manometer and flowmeter between flow pump **FPA** and balance chamber.
   Note
   There can still be calibration couplings (KK1/2/3/4) in Dialog machines. These are obsolete since the Dialog Advanced, i.e. if there are leakage problems disassemble the couplings and conncet the tubing directly.
2. Insert both dialyser couplings into a vessel filled with water.
3. Select *Test 1.20 Water Part (Overview)* in TSM.
4. Set speed of flow pump **FPA** to 500 ml/min.
5. Set temperature **TSD** to 37 °C.
6. Clamp tubing between manometer and balance chamber (from **FPA**).
7. Loosen lock nut on **RVFPA** adjustment screw.
8. Set a pressure of 975 mmHg (1300 mbar) with the adjustment screw of **RVFPA**.
9. Tighten lock nut again.
10. Remove manometer and flow meter.

4.10.4.20 Calibration Dialyser Inlet Throttle Valve DDE

You can calibrate the dialyser inlet throttle valve **DDE**.

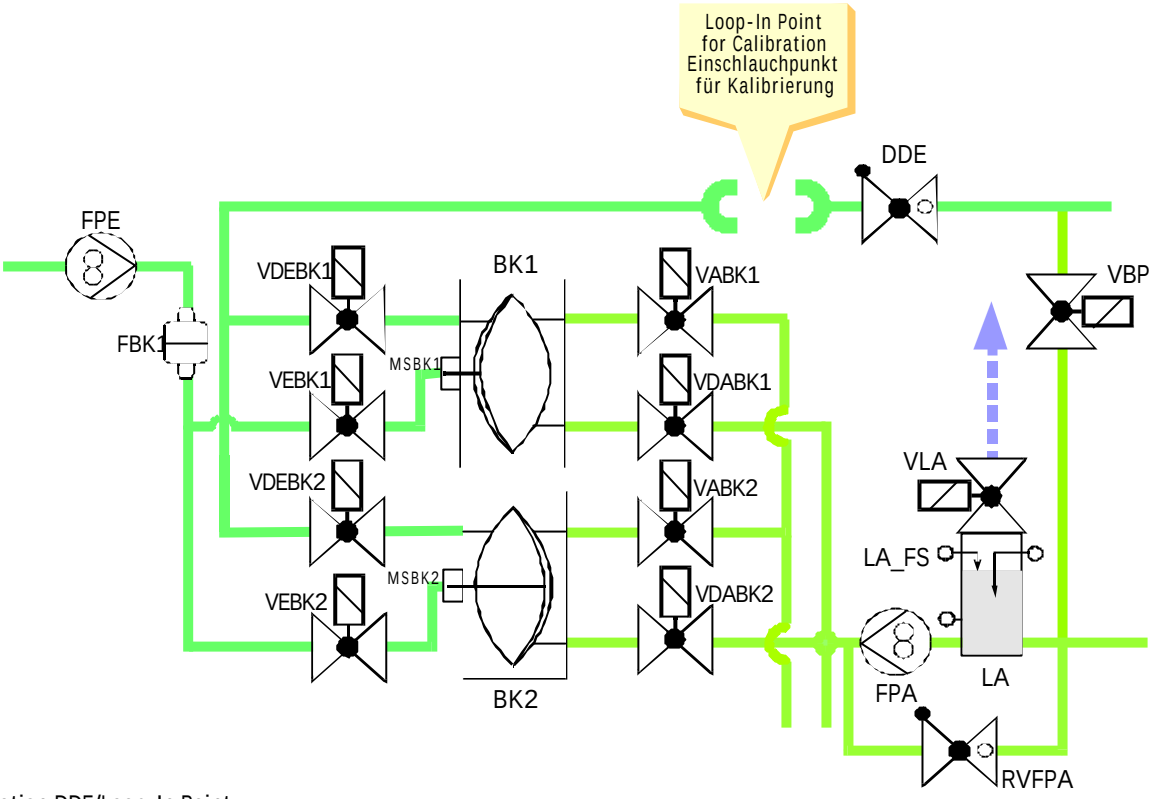


Fig.: Calibration DDE/Loop-In Point

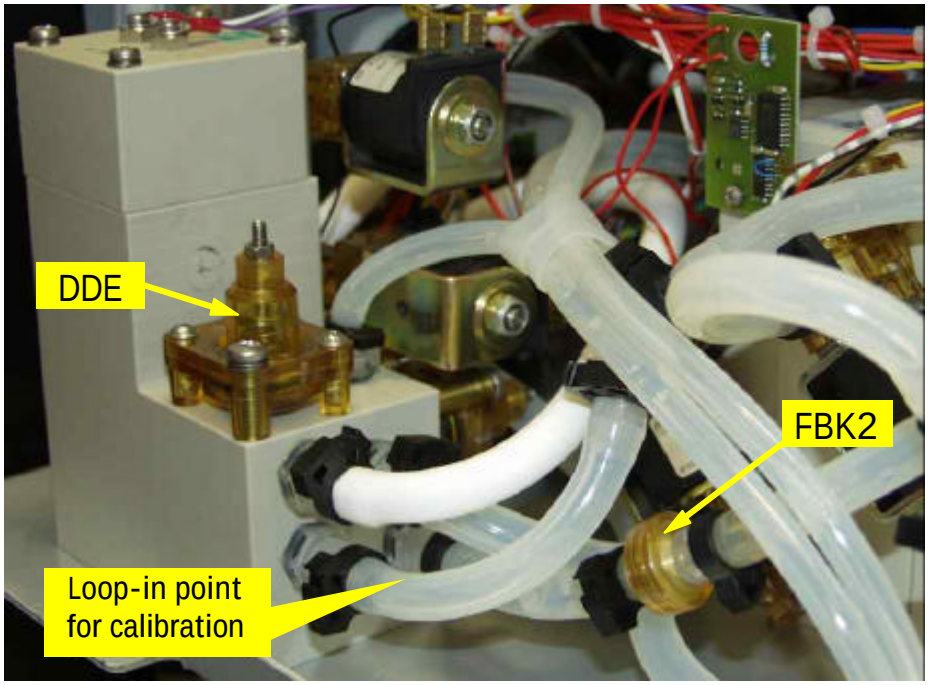


Fig.: UF Sub-Rack with DDE (Dialog Advanced)

- Manometer 0 to 4 bar (770 1357)
- Flow meter (770 0857)
- Allen key

Please ensure that the manometer and connection tubing are at the same level as the throttle during calibration.

1. Connect manometer and flowmeter between balance chamber and dialysate inlet throttle **DDE**.
2. Insert both dialysate couplings into a vessel filled with water. Thus uncontrolled pressure conditions are prevented.
3. Select *Test 1.20 Water Part (Overview)* in TSM.
4. Set speed of flow pump **FPA** to 500 ml/min.
5. Set temperature **TSD** to 37 °C.
6. Loosen lock nut on **DDE** adjustment screw.
7. Set a pressure of 300 mmHg (400 mbar) with the adjustment screw of **DDE**.
8. Tighten lock nut again.
9. Remove manometer and flow meter.

4.10.4.21 Calibration Pressure Reducer Valve DMV

You can calibrate the pressure reducer valve **DMV**.

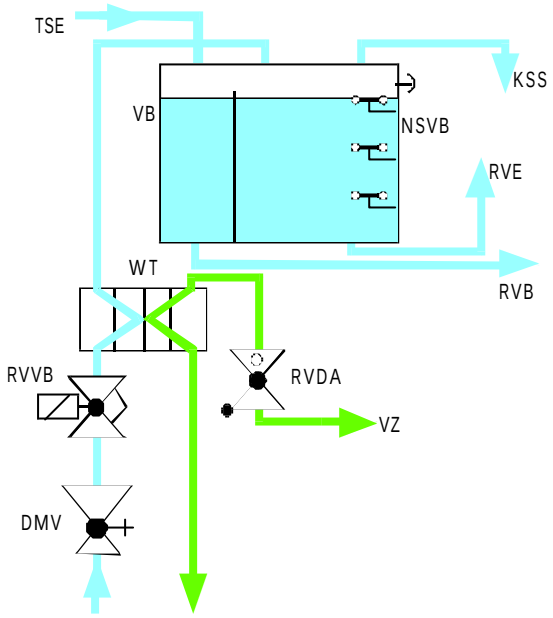


Fig.: Calibration DMV

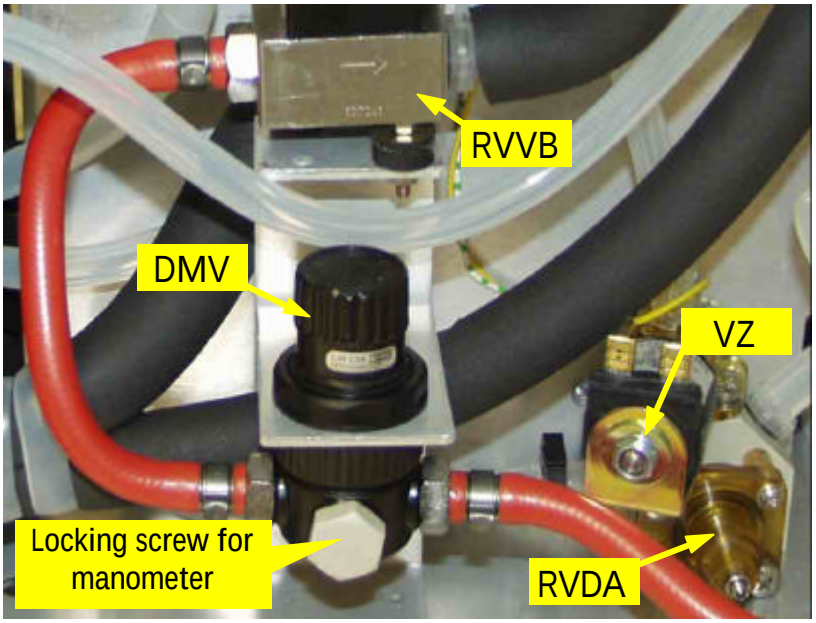


Fig.: Water Inlet Sub-Rack with DMV (Dialog Advanced)

- Manometer 0 to 2.5 bar (3451 1571)

The calibration of **DMV** is performed in the dynamic operating mode (**FPE** running, level in the upline tank is controlled).

1. Disconnect water inlet hose from wall connection (close water tap if necessary). Start briefly the unit to achieve a pressure free condition in the water inlet part.
2. Remove locking screw from **DMV** and screw in the manometer (if necessary use Teflon tap to prevent leakages).

   Note

   Pressure reducer valves **DMV** without a locking screw for the connection of a manometer were used in older Dialog machines. These machines have a separate connection for the manometer.
3. Connect water hose and open the water tap.
4. Open the following menus in the TSM service program: *Manual Test and Calibration*, *LLC Manual Test* and *1.9 Water Inlet, Upline Tank and Flow Pump FPE*.
5. Set **FPE** to 2000 min^{-1} and **RVVB** to 100 % (the level in the upline tank must be controlled between middle and filled **NSVB**).
6. Unlock safety ring of pressure reducer valve **DMV** and set pressure to approx. 1.3 bar with the adjustment screw.
7. Close water tap.
8. Lock safety ring of pressure reducer valve **DMV**.
9. Switch off Dialog.
10. Disassemble manometer.
11. Reassemble locking screw.

4.10.4.22 Calibrate Arterial Tubing Clamp SAKA and Venous Tubing Clamp SAKV

You can calibrate the gap for the arterial tubing clamp **SAKA** and the venous tubing clamp **SAKV**.

- Calibration template 1,4/1,5 (770 2493)

1. Remove cap A (e.g. use a sharpe knife to lift out).

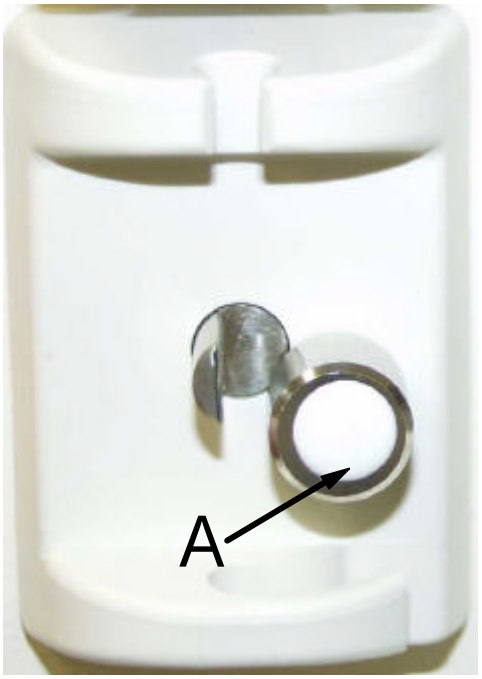
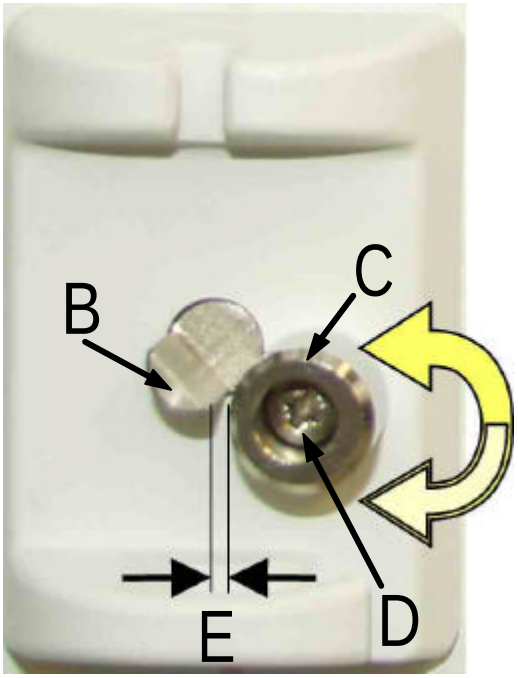


Fig.: Tubing Clamp (SAKA/SAKV)



Set gap E to 1.4 mm with 1.4 mm template.

2. Loosen screw D.
3. Push 1.4 mm template between clamp B and eccentric C.
4. Turn eccentric C until 1,4 mm is set.
5. Tighten again screw D

   Note
   The 1.4 mm template fits through the gap.
6. Check wit the 1.5 mm template.

   Note
   The 1,5 mm template must not fit through the gap.
7. Reassemble cap A.

4.10.4.23 Setting Servomotor for Disinfection Valve VD

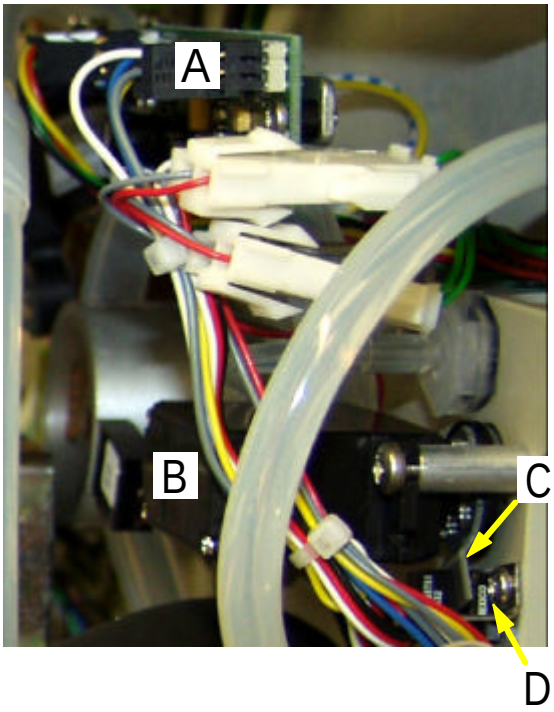


Fig.: Disinfection Valve VD/Rinsing Bridge

Basic Position Disinfection Valve VD

The servomotor and the servomotor board must only be replaced together, because they are a calibrated unit.

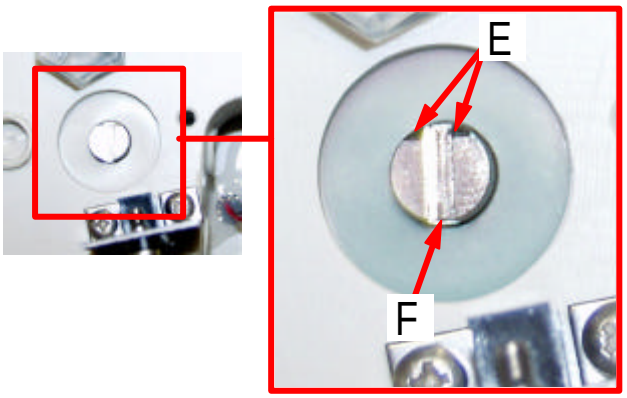
The position tag C of the servomotor B must be seated in the light barrier D when assembled (see figure).

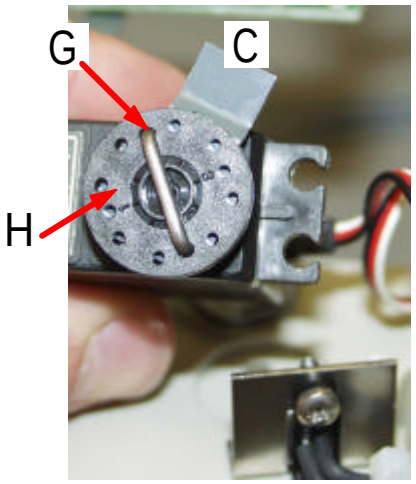
This basic position must be guaranteed if the servomotor is disassembled and assembled again on the disinfection valve (rinsing bridge). Thus the correct operation of **VD** is guaranteed, i.e. switching from the air line to the disinfection line.

In basic position the disinfection valve **VD**:

- is open to the air line, i.e. disinfectants can not be sucked in.

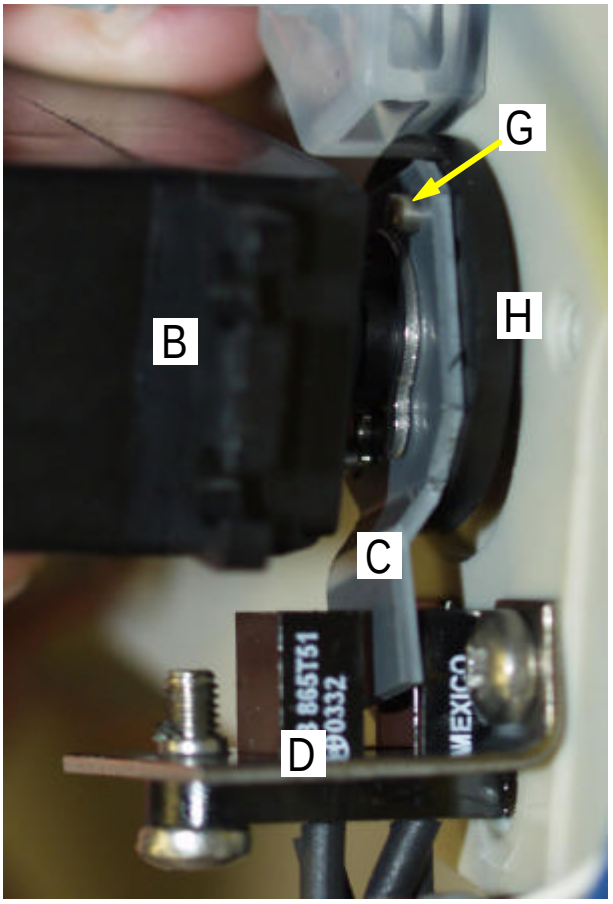
1. Open front door of Dialog.
2. Pull off the connector A from the desinfection valve board.
3. Disassemble servomotor B.
4. Prior to the assembly of the new servomotor B: pay attention to the position of the bevel **E** on the eccentric axle. The bevel **E** must be in upper position (see figure).





Do not pull off the bow G from the control disc H, because it's position is set ex works.

5. The bow **G** on the control disc **H** must be seated in the eccentric groove **F**.

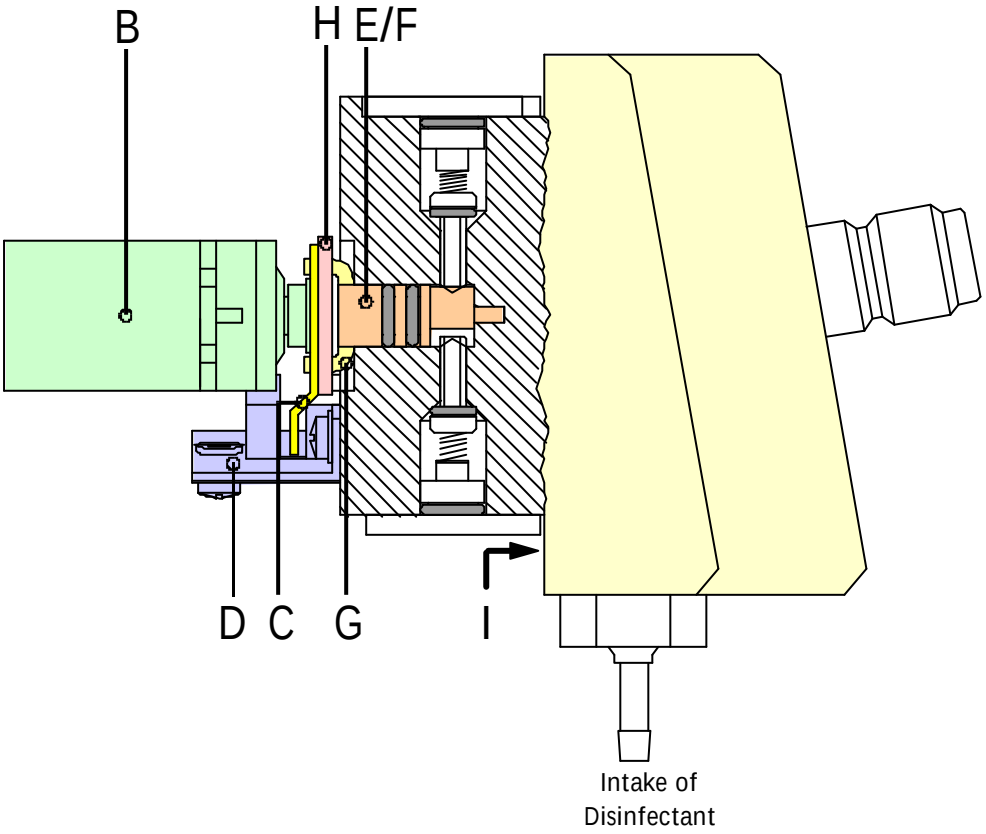


6. Assemble servomotor B.

   The position tag C of the servomotor B is seated in the light barrier D. The bow G (not visible) is seated in the eccentric groove F.

7. Plug in connector to desinfection valve board.

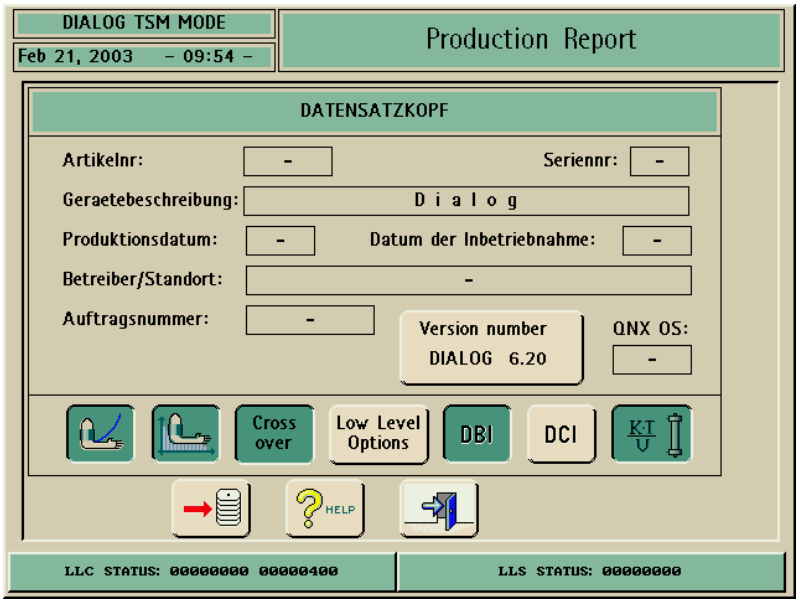
8. Check function of the desinfection valve (position tag C in light barrier D).



B Servomotor
C Position tag
D Light barrier
E Bevel on eccentric axle
F Eccentric groove
G Bow (only partly visible, is seated in the eccentric groove)
H Control disc
I Rinsing bridge

4.11 Production Report

The delivery data of the Dialog are displayed in the menu, i.e. must be entered during the commissioning of the machine. Options can be activated in the menu:
Icons
e.g. ABPM, bioLogic RR, cross over
Low Level Options
e.g. HDF online, BIC cartridge holder



Activate the *Production Report* menu with the *Production Report* key in *TSM Main Menu*.

Options assembled in the machine must be activated. Options that are retrofitted in the Dialog must also be activated in this menu or in the *Low Level Options* menu (see also 4.11.2).

- ABPM
- bioLogic RR
- Cross over
- Low Level Options
- DBI
- DCI
- KT/V

ABPM Automatic Blood Pressure Masurement

If the option is assembled in the machine or the option is retrofitted it must be selected and saved to activate the option.

bioLogic RR Automatic Blood Pressure Stabilisation

The bioLogic RR icon is displayed after the installation software was installed for the bioLogic RR option. The bioLogic RR must be selected and saved to activate the option.

Cross Over

If the cross over option is assembled in the machine it must be selected and saved to activate the option.

DBI Dialog Bedside Link Interface

The DBI option can be activated with the *DBI* icon (if the option is installed in the Dialog machine). The TLC detects a connected BSL module before the *Production Report* is opened. If a BSL module was detected the *DBI* icon and *DCI* icon are displayed. The *DBI* icon and *DCI* icon are interlocked.

For detailed information regarding networking for Dialog machines see the technical information: Nexadia BSL network and software for networking.

DCI Data Communication Interface

A Dialog machine communicates via a serial RS232 interface if a DCI option is assembled. A Dianet protocol is used for communication. The *DBI* icon and *DCI* icon are interlocked.

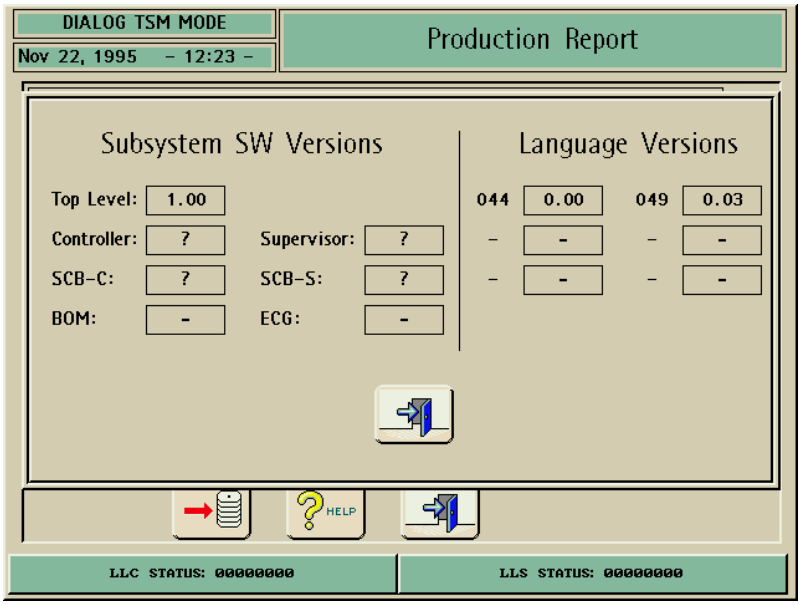
For detailed information regarding networking for Dialog machines see the technical information 4/00 - Data communication interface DCI.

KT/V

The *KT/V* option can be selected and saved in the *Production Report*.

4.11.1 Version Number Dialog

Press the *Version Number Dialog* key. The *Version Number Dialog* menu is opened.



The software version status of the Dialog is displayed.

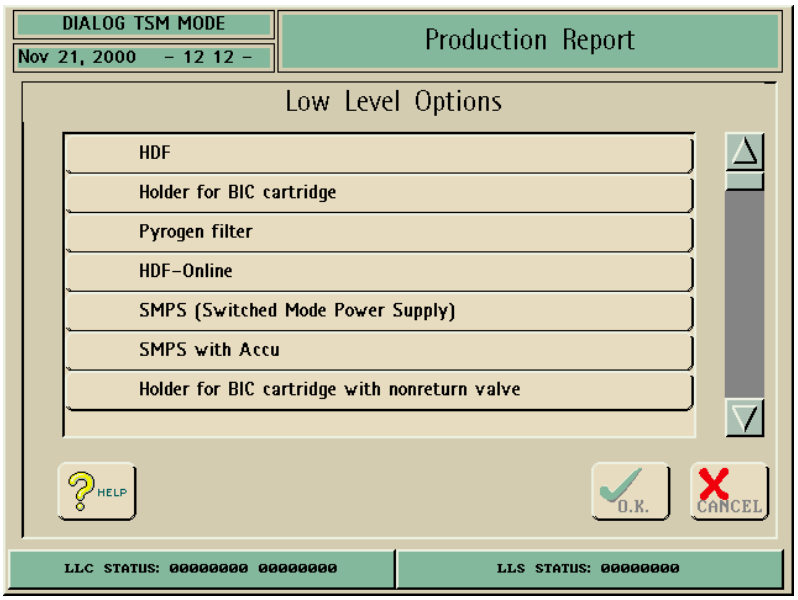
The various software versions for top level, controller, supervisor, etc. are displayed and can be checked. These versions depend on the installed Dialog software version. The following software statuses can be checked:

Subsystem SW Versions
- Top-Level
- Controller
- Supervisor
- SCB_C
- SCB_S

Language Versions (Therapy Language)
- 044 - English
- 049 - German
- or further therapy languages

4.11.2 Low Level Options

Press the *Low Level Options* key. The *Low Level Options* menu is opened.



Options assembled in the machine must be activated in the *Low Level Options* menu. Options or other equipment that are retrofitted in the Dialog must also be activated in this menu. The following options can be activated:

Low Level Options
- HDF
- BIC cartridge holder
- Pyrogen filter
- HDF online
- SMPS (switch mode power supply)
- SMPS with battery
- BIC cartridge holder with nonreturn valve

HDF	The HDF bag option must be selected and saved in the menu *Low Level Options* to activate the option.
BIC Cartridge Holder	The BIC cartridge holder (version 1) option must be selected and saved in the menu *Low Level Options* to activate the option. This type of BIC cartridge holder is without nonreturn valve and can be retrofitted in machines with a software version up to 3.46.
HDF Online	The HDF online option must be selected/activated in the menu *Low Level Options* for HDF online machines.

Pyrogen Filter

The pyrogen filter option must be selected and saved in the menu *Low Level Options* to activate the option.

SMPS (Switch Mode Power Supply)

The SMPS (switch mode power supply) must be selected and saved in the menu *Low Level Options* if a switch mode power supply is assembled in the machine to activate the different functions.

SMPS with Battery

If the battery option is assembled or a battery option is retrofitted it must be selected and saved in the menu *Low Level Options* to activate the option.

BIC Cartridge Holder with Nonreturn Valve

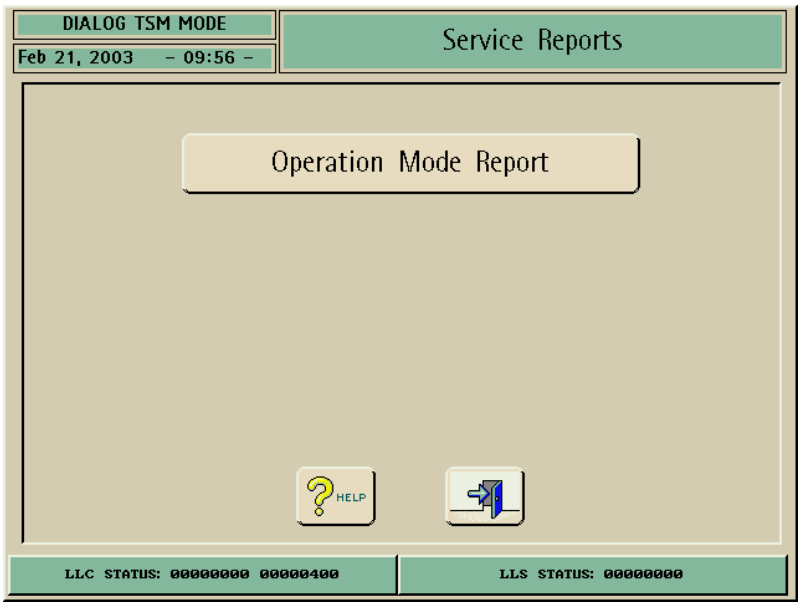
If the option BIC cartridge holder with nonreturn valve is assembled or the option is retrofitted it must be selected and saved in the menu *Low Level Options* to activate the option.

The BIC cartridge holder with nonreturn valve has an additional drip protection in the top and bottom holder (spring-loaded nonreturn valve). Additionally a swivel arm is integrated in the top holder, which opens the nonreturn valves when the holders are closed. This type of BIC cartridge holder can be retrofitted in machines with a software from 5.00.

Exchange cartridge during a dialysis:

The holder must be closed after removing an empty cartridge. A reset is performed (via BKUS in the bottom holder, BKOS is obsolete in the top holder). Thus the machine is reset and is ready to start a new filling procedure for the new cartrdige.

4.12 Service Reports



The *Operation Mode Report* can be selected in the *Service Reports* menu.

Operation Mode Report

The switching from therapy mode to TSM mode and back to the therapy mode is documented with date and time.